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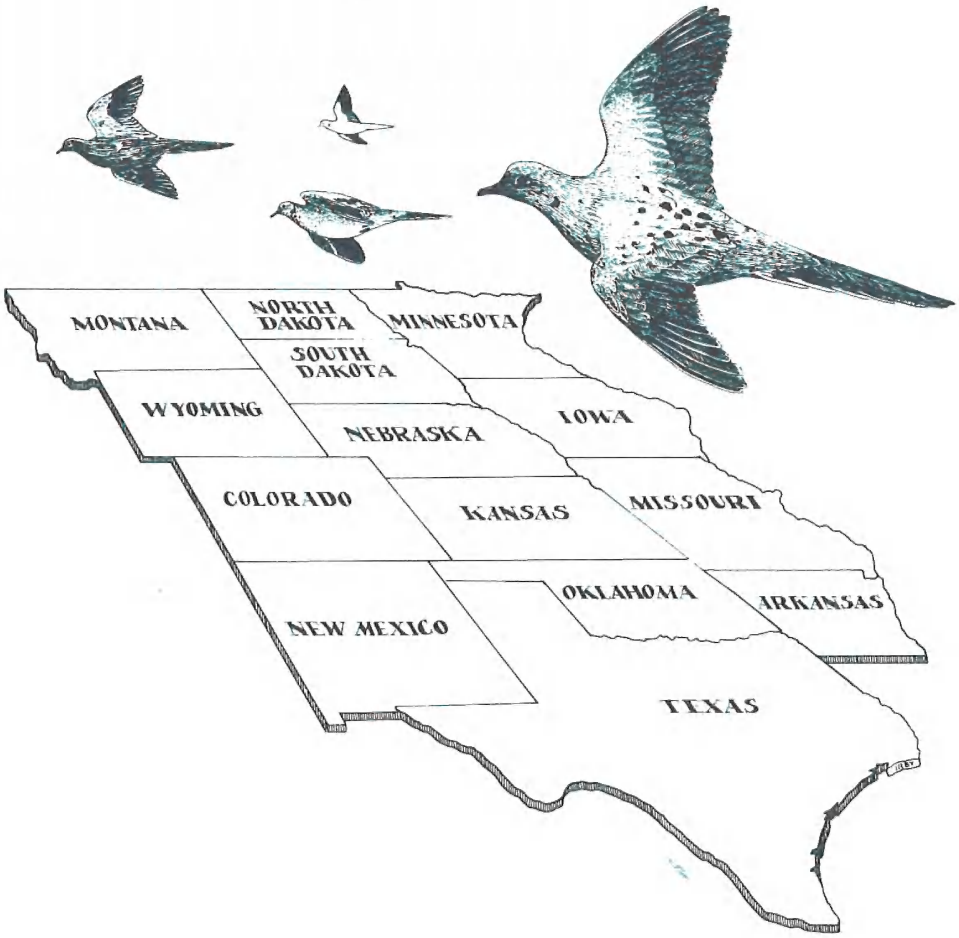
Migration, Harvest, and Population Dynamics of Mourning Doves Banded in the Central Management Unit, 1967–77



UNITED STATES DEPARTMENT OF THE INTERIOR
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MIGRATION, HARVEST, AND POPULATION DYNAMICS OF MOURNING DOVES BANDED IN THE CENTRAL MANAGEMENT UNIT, 1967–77

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Migration, Harvest, and Population Dynamics of Mourning Doves Banded in the Central Management Unit, 1967–77

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Abstract

A banding program for mourning doves (*Zenaida macroura*) was conducted by the 14 Central Management Unit (CMU) States and the U.S. Fish and Wildlife Service during 1967–74. Banding and recovery records, as well as data from annual call-count and harvest surveys, were subsequently analyzed by a subcommittee of the Central Migratory Shore and Upland Game Bird Technical Committee. This paper presents information on mourning dove habitat, hunting regulations, and harvest in the CMU; distribution and derivation of band recoveries in and from the CMU; distribution of mourning dove harvest in Mexico and Central America; chronology of migration; survival and recovery rates; effects of hunting on CMU mourning dove populations; and indirect nationwide mourning dove population estimates.

Of 332,314 doves banded preseason in the CMU, 9,067 were subsequently recovered. Of the 5,266 direct recoveries, most were obtained within the CMU (79%) and in Latin America (15%); the Eastern Management Unit (EMU) and Western Management Unit (WMU) reported 6 and 1%, respectively.

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Over 75% of the CMU harvest was taken in Texas, Missouri, Kansas, and Oklahoma. Of doves originating in the United States and recovered in Latin America, 89% occurred in Mexico and 11% in Central America. Costa Rica seems to be the southward terminus for migrating doves from the United States.

Immature mourning doves initiated southward migration first; they were followed by adult females and then adult males. Doves began to enter Texas before September, but the bulk of the population arrived later in September. The peak recovery period in Mexico was mid-October.

Average annual survival rates of adult and immature mourning doves banded in the CMU were 53 and 44%, respectively; average annual recovery rates were 1.5 and 2.0%. Doves banded in States with hunting seasons had lower survival rates than those banded in States without hunting seasons.

The estimated proportion of total annual mortality (47% for adults and 56% for immatures) due to hunting was 9.9 and 11.2%, respectively. It was concluded that hunting has not adversely affected the mourning dove population in the CMU.

The average fall flight population of mourning doves in the 48 conterminous States was estimated to be between 350 and 600 million birds.

Background

Unlike the passenger pigeon (*Ectopistes migratorius*) whose hordes probably numbered between 3 and 5 billion before its population collapse and extinction (Schorger 1973), the mourning dove (*Zenaida macroura*) has prospered with man's taming and modification of the North American scene. Although the mourning dove has not matched the passenger pigeon in numbers, it has multiplied in the face of immense changes in land use arising from agricultural and industrial development and human inhabitation. The mourning dove is found throughout the United States in habitats ranging from deserts to pine forests. A highly adaptable and prolific species, it occurs compatibly with man and his developments. The mourning dove is known to vast numbers of North Americans, including people having no particular interest in wild birds. Beyond question, it offers more recreation in terms of hunter harvest than any other resident or migratory game bird. More mourning doves are harvested in the United States than all species of waterfowl combined (Peters 1961), by a factor of 3 or 4.

Management of mourning doves in the United States is primarily a Federal responsibility because of migratory bird treaties with various countries, including Canada and Mexico. These treaties are implemented by the Migratory Bird Treaty Act of 1918, which recognizes that sport hunting is a legitimate use of the migratory game bird resource. The Act also provides standards by which the Federal Government determines whether and to what extent the hunting of migratory game birds is to be permitted. Historically, State conservation agencies have played an important role in supporting and supplementing Federal migratory game bird management programs. Their activities have included research, establishment and enforcement of hunting regulations within the Federal frameworks, habitat acquisition and management, and information and education programs (U.S. Department of the Interior 1975).

Thus, it was natural that the U.S. Fish and Wildlife Service and the Central Migratory Shore and Upland Game Bird Technical Committee embarked upon a cooperative preseason mourning dove banding program and a comprehensive analysis of the resultant data. This report summarizes the findings of that study.

Overview of the Mourning Dove

Detailed information on the life history of the mourning dove is available elsewhere (Hanson and Kossack 1962; Keeler 1977; and Madson 1978). Nonetheless, several key points deserve mention here.

Distribution

In the 48 conterminous States, the lower portions of the Canadian prairie Provinces, Mexico, and the Greater Antilles, the mourning dove is a common breeding bird (Fig. 1). It has been estimated that the mourning dove is one of the most abundant birds in the United States (Robbins and Van Velzen 1969), perhaps reaching autumn population levels of over 500 million birds (U.S. Department of the Interior 1975).

Two subspecies of mourning doves are recognized in the United States (Aldrich and Duvall 1958): Z. *m. carolinensis* generally occurs east of the Mississippi River and Z. *m. marginella* ranges from the prairie States westward. A zone of overlap southwestward from Michigan through Missouri into eastern Texas contains an intermediate form of the two races (Fig. 2).

Most mourning doves annually migrate south from their breeding areas to winter in the southern United States, Mexico, Central America, or the West Indies (Keeler 1977). Upon return to the breeding grounds in spring, doves are remarkably faithful to their nesting area of the previous year, sometimes using the same nest (Tomlinson et al. 1960; Harris 1961). Some subpopulations appear to be non-migratory and a few birds winter in the northern portions of their breeding range (Chambers et al. 1962; Hennessy and Van Camp 1963; Weber 1980).

Fig. 1. Mourning doves frequently select evergreens, such as this spruce, as nesting sites in early spring. This adult male is feeding two squabs. Minnesota. (Photo by R. Bennett, USDA–SCS).

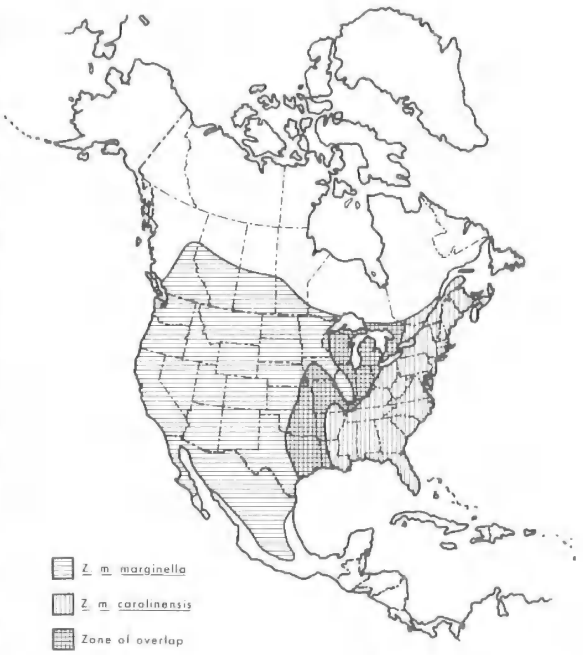


Fig. 2. Breeding range of the mourning dove (Aldrich and Duvall 1958; Godfrey 1966; Leopold 1972; Salt and Salt 1976; Armstrong 1977; D. Bystrack, personal communication).

Fig. 3. Boundaries of Western, Central, and Eastern mourning dove management units. Hunting and non-hunting status of various States are indicated, 1967–72. Nebraska, Ohio, and Wyoming allowed hunting seasons during some years after 1972; South Dakota discontinued dove hunting between 1972 and 1977.

Management Unit Concept

In the early 1950's, biologists recognized the need for separate management of specific mourning dove populations throughout the United States. Wight (1954) pointed out that the flyways developed for waterfowl regulation (Lincoln 1935) were unsuitable for mourning dove management. He further urged that an analysis of mourning dove banding data be conducted to delineate functional units for this species. In response to this and other appeals, the U.S. Fish and Wildlife Service published an analysis of the then existent banding records for mourning doves in the United States (Kiel 1959). Kiel concluded that there were three clearly defined areas within the country which contained mourning dove populations that were largely independent of each other. He suggested that these three zones be considered as separate management units. As a result, the Eastern (EMU), Central (CMU), and Western (WMU) management units (Fig. 3) were established as operational entities by 1960 (Kiel 1961) and management decisions have been made within those boundaries since then.

Population Monitoring

Mourning dove breeding populations are monitored annually by a series of randomly selected call-count routes in the United States. Currently, there are more than 1,000

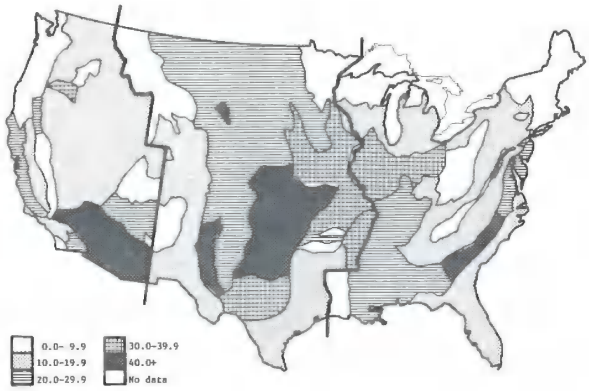


Fig. 4. Average numbers of mourning doves heard per route by physiographic region (after Dolton 1977).

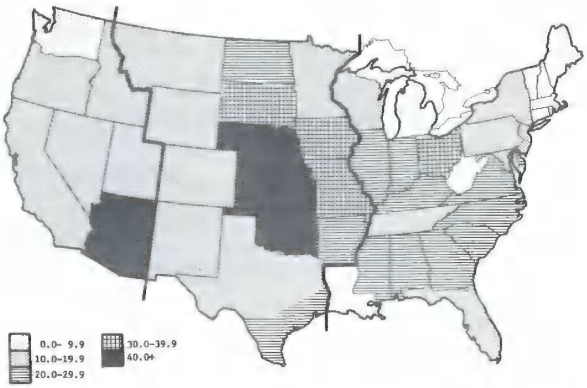


Fig. 5. Average numbers of mourning doves heard per route by State (after Dolton 1977).

routes throughout the Nation (Dolton 1977). Each call-count route has 20 3-minute listening stations spaced at 1.6-km intervals. At each listening stop, the number of doves heard giving the five-syllable perch coo are counted. The average numbers of birds heard calling per route provide a year-by-year index to breeding dove population numbers. Although some problems of interpretation remain, these population indices are believed to be valid for detecting major changes in breeding population levels for management units and for determining long-term population trends for States and management units (Foote and Peters 1952; Baskett et al. 1978). This information is used by wildlife administrators to set annual hunting regulations.

Importance of Breeding Areas

Although mourning doves breed throughout the United States, certain areas contain higher densities of breeding doves than others. By using the average number of doves heard calling on the national call-count routes between 1967 and 1975 (1967 and 1974 in the CMU), the respective densities can be illustrated for physiographic regions (Fig. 4) and States (Fig. 5). Generally, the highest mourning dove densities are found in "America's Breadbasket" (Kansas, Nebraska, and Oklahoma), in the Sonoran and Mojave deserts of Arizona and California, and in the Piedmont area of the East. The lowest dove densities are in the forested areas of the North, Northwest, and Rocky Mountains. In the CMU, the States of the two easterly tiers clearly contain the highest breeding dove densities.

The relative importance of various breeding mourning dove populations can be further illustrated by Breeding Population Indices obtained for each State. These indices were obtained by multiplying the average number of calling birds per route by the geographic size of the area where they are found (Appendix Table A-1). The CMU constitutes 46% of the land area of the United States and contains about 56% of the breeding dove population. Furthermore, the mid-tier of the CMU States (North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas) makes up only 21% of the United States land area, but contains about 36% of the Nation's breeding doves.

Central Management Unit Mourning Dove Habitat

The CMU is characterized by a variety of habitat types because of its heterogeneity in elevation, topography, and climate. Elevations range from sea level along the Texas Gulf Coast to over 4,300 m in the Rocky Mountains. Temperatures vary from hot in the summer and mild in the winter along the Mexican border to cool in the summer and frigid in the winter in Montana and North Dakota. Annual precipitation in western Texas averages less than 20 cm, whereas that of the Texas Gulf Coast is more than 142 cm. Vegetation reflects the various altitudinal, climatic, and edaphic conditions found throughout the CMU. Natural climax vegetation still occurs over portions of the unit but much of the land has been modified greatly by the activities of man.

Habitat may be described by various standards, including its natural vegetation and its present use and composition. Perhaps the most useful system for describing potential vegetation is that devised by Kuchler (1964) and later modified by the U.S. Geological Survey (1970). The modified Kuchler system includes 106 vegetation types, 60 of which are present somewhere in the CMU.

For the present paper, the Kuchler vegetation types were consolidated into seven major groups (Fig. 6). The *needleleaf forests* are in the upper elevations of the Rocky Mountains and northern Minnesota. The *broadleaf forests* are restricted to the eastern tier of CMU States, major river bottoms extending westerly to their headwaters, and a

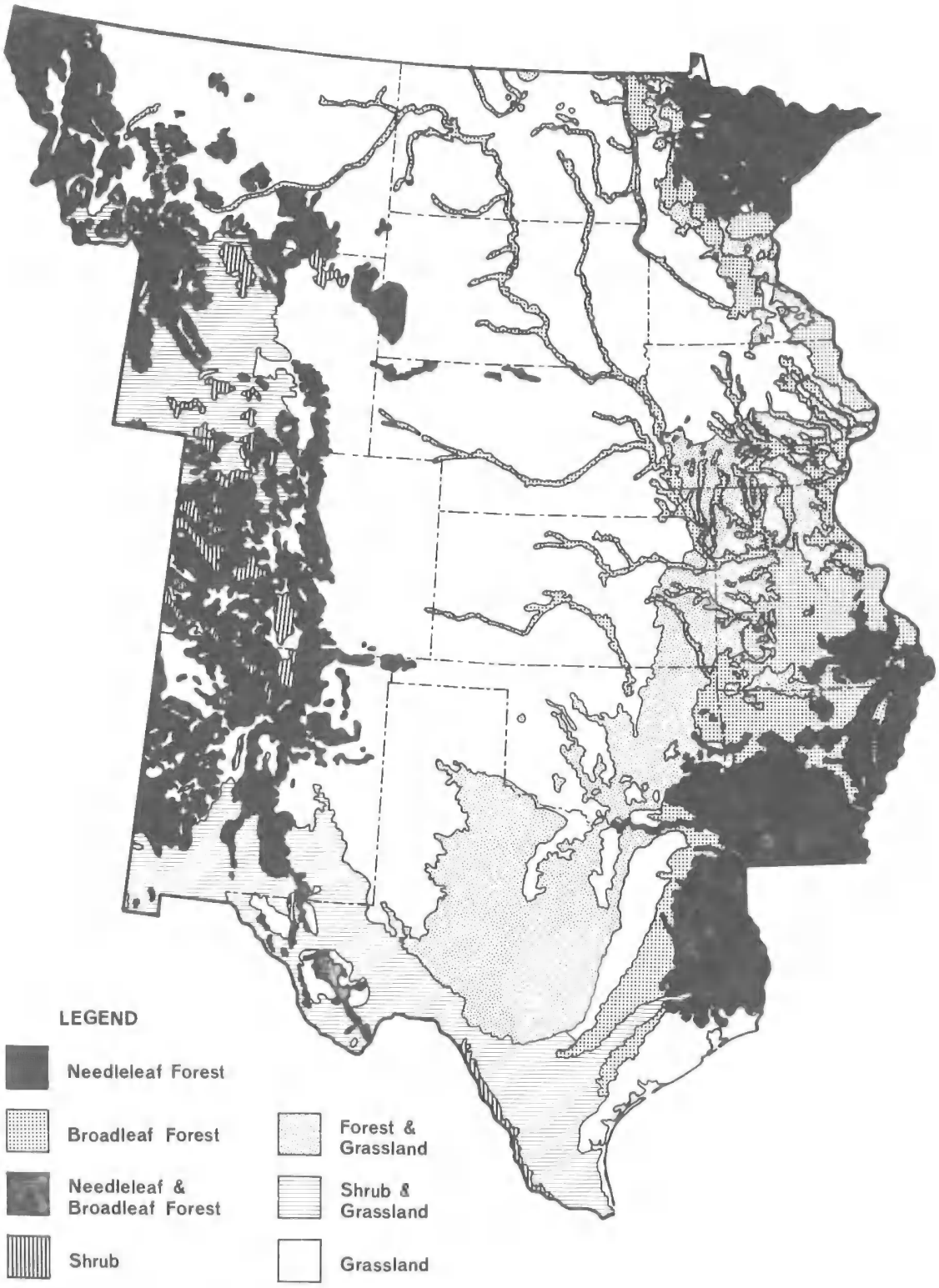


Fig. 6. Vegetation types in the Central Management Unit.

Fig. 7. Mourning doves typically construct fragile nests in trees and shrubs. The most common clutch is two eggs, with one- and three-egg clutches occasionally found. Crosby County, Texas. (Photo by R. M. Kral, USDA–SCS).

Fig. 8. Mourning doves frequently nest on the ground if trees and shrubs, which provide preferred nest sites, are lacking. Gray County, Texas. (Photo by W. B. Brooks, USDA–SCS).

limited area of eastern Texas. The *mixed needleleaf and broadleaf forests* are generally confined to southeastern Missouri, Arkansas, and eastern Texas. *Shrub vegetation*, more often found in conjunction with grasslands, dominates local western areas and a narrow strip along the Rio Grande in south Texas. *Mixed forests and grasslands* occupy southern Iowa, northern and western Missouri, eastern Kansas, mid-eastern Oklahoma, and much of central Texas. The *shrub–grassland association* is found in southern and western Texas and southern New Mexico. The largest single vegetational zone is composed of the various *grasslands*. This zone, referred to by many as the Great Plains, generally occupies the mid-tier of the CMU and ranges from North Dakota deep into Texas.

A second approach in describing habitats of the CMU is in terms of man-caused use or change. These elements include urbanization, farming, grazing, lumbering, creation of water supplies for livestock, irrigation, flood control and power generation, and often subtle but nonetheless important degradation of air, soil, and water quality. These activities modify the original habitats either beneficially or detrimentally, depending on which forms of wildlife are involved.

The mourning dove has adapted to all of the CMU habitats, both modified and unmodified, as a breeding, migrating, or wintering species, except possibly in the highest alpine meadows and forests of the Rocky Mountains. Basically, the mourning dove is a tree-nesting species (Fig. 7), although it frequently nests on the ground when trees are not available (Fig. 8). It generally shuns deep woods or forest but readily utilizes open woodlands and the "edge" between forest and prairie biomes. It is a seed-eater that has adapted readily to small grains such as wheat and sorghum. Thus, the farming communities of the Midwest have proved to be ideal as mourning dove nesting habitat.

Possibly the most important single habitat change affecting mourning doves in the CMU was the breaking of grasslands for crop production, especially cereal grains. Mechanized harvesting leaves immense supplies of waste grain in fields (Fig. 9) and doves rely heavily on them for food. Concurrent with grain production, other farming practices have created conditions favorable to habitation by mourning doves. These practices included planting of trees for field and farmstead shelterbelts (Fig. 10) and development of ponds and lakes (Fig. 11) for use as drinking water by livestock. Additional nesting and roosting habitat was provided by trees and shrubs which were planted in newly established cities and towns associated with the farming communities. Some of the highest mourning dove breeding densities have been found in these urban areas of the CMU.

Along the southeastern edge of the CMU, the alteration of climax forests for lumbering and agriculture probably has increased dove nesting habitat by creating a greater

Fig. 9. Perhaps the most significant land-use change in the Central Management Unit was the breaking of the prairies for small grain production. Sorghum is the major grain produced in the southern part of the unit. Crosby County, Texas. (Photo by R. M. Kral, USDA–SCS).

Fig. 10. In many sections of the middle and northern Central Management Unit, the original grasslands have been replaced by corn and small grain. Farmstead and field shelterbelts provide important nesting sites, whereas waste grain furnishes food. Brown County, South Dakota. (Photo by R. B. Branstead, USDA–SCS).

amount of "edge." In the drier western portions of the CMU, precipitation is normally too unreliable for sustained dry-land crop production. Development of irrigation systems, either as gravity flow from impounded reservoirs or pumped from aquifers, has permitted productive farming of lands otherwise unsuited for intensive agriculture.

Conversely, removal of shrubs and trees throughout the CMU has resulted in loss of important nesting sites for mourning doves. In southwestern areas, extensive programs of brush control and phreatophyte removal have been implemented during the past 20 years to improve pastures and conserve water (Fig. 12).

Of particular concern is the relatively recent practice of eliminating shelterbelts in the Great Plains of the CMU. These windbreaks were originally planted to reduce wind erosion of prairie soils and to protect buildings and livestock. Many of the shelterbelts date back to the mid-1930's when more than 200 million seedling trees were planted on 30,000 farms in six Great Plains States (Comptroller General of the U.S. 1975). These and later plantings have provided badly needed protection from winds during droughts. Removal of the shelterbelts in recent years has been precipitated by overmaturity and death of some of the trees, and by a desire of farmers to put more of their land into direct production of crops. Although farmers recognize the wind-reduction and increased-humidity benefits of windbreaks, continued retention in many situations is not compatible with modern agricultural practices such as mechanized harvesting and center pivot irrigation systems. Soil Conservation Service officials fear that the continued removal of windbreaks in the Great Plains could have an adverse effect in future years on soil conservation,

Fig. 11. Water provided by a stockpond and suitable nesting cover afforded by trees and brush contribute to this good mourning dove nesting habitat. Western North Dakota. (Photo by D. R. Warren, USDA–SCS).

wildlife, and the general environment (Comptroller General of the U.S. 1975).

Whereas the presence of trees and brush in grassland areas may not always constitute a critical need of doves (as doves also nest on the ground), existing evidence strongly suggests that doves prefer tree nesting sites over ground sites in the Great Plains (Downing 1959; Stewart 1975; Olson 1980).

Fig. 12. Chaining of trees and brush is least detrimental to nesting mourning doves if patches of trees and brush are left standing along drainageways and on steeper terrain. Bandera County, Texas. (Photo by E. Seidensticker, USDA–SCS).

Habitat used by mourning doves during migration and on the wintering grounds is similar to that of the nesting grounds. Doves seek out groves of trees or brush species for roosting and these areas must be near water and food. Nearly any grain production area with an adjacent grove of trees suffices for their needs during this period.

With the varied habitat types in the CMU and the ability of mourning doves to adapt to them, it is not likely that dove populations will be materially affected adversely by land-use practices in the immediate future. However, wildlife managers must keep abreast of alterations in land and agricultural practices to ensure that mourning dove populations will continue to thrive.

Mourning Dove Hunting Regulations and Harvest

Hunting

United States. – With the increase of mourning dove breeding populations in the United States and coincident decreases of several other game bird populations, a dove hunting tradition has slowly built up through the years to the point where more doves are now taken by hunters on the North American Continent than any other single game bird (R. E. Tomlinson, H. M. Reeves, unpublished reports). Hunting of mourning doves is most popular in the South and Southwest, but it affords a substantial amount of recreation in the Midwest as well.

The mourning dove season ushers in the hunting season in most States, usually beginning in September and concluding in October or November. Hunters shoot mourning doves with shotguns of several gauges; the most popular shot sizes are Nos. 7½–9. Hunting strategies vary, but they can be classed basically as field shooting, hunting near water sources, roost shooting, pass shooting, and jump shooting. Each method has its adherents, but field and pass shooting are most popular. Hunting practices vary by area and are dependent on climatic, vegetative, and water conditions as well as personal preference.

Latin America. – Mourning dove hunting also occurs throughout the winter range in Mexico and Central America (Blankenship and Reeves 1970). Doves arrive on the southern wintering grounds in October and generally migrate northward in February or March. Hunting takes place throughout that period, but it is usually heaviest during December and January (Estrada O. 1978; P. C. Purdy, unpublished report).

In Mexico and Central America, "legal" hunting with shotguns by residents is usually through the auspices of hunting clubs from metropolitan areas. Groups of sportsmen organize and hunt doves together in agricultural areas usually within 200 km of their residences. Hunting by nonresidents (mainly Americans, Jamaicans, and Canadians) occurs in several Latin American countries and is a valued type of tourism. Hunting by foreigners is usually a group activity through organized guide service. During the study years, Mexico, El Salvador, Honduras, and Nicaragua promoted hunting by tourists.

Subsistence hunting is widespread but occurs in unknown amounts in Latin America. Methods of taking doves include traps, .22 caliber rifles, and slingshots. There is some market hunting, but this activity is thought to be small.

Harvest

United States. – Although there is little doubt that the harvest of mourning doves by hunters has greatly increased in the United States during the past 40 years, a uniform nationwide survey has been unavailable to measure this important statistic accurately. Past estimates of mourning dove harvest, therefore, have been based on guesswork, compilations of incomplete State statistics, or indirect computations from several data sources. Although these estimates are subject to considerable error, they can be used as gross approximations of the harvest for chronological comparison.

In 1942 the estimated harvest of mourning doves in the United States was 11 million birds (McClure 1944). The annual kill slowly increased to about 15 million doves in 1949 (Dalrymple 1949) and 19 million in 1955 (Peters 1956). By 1965 the U.S. mourning dove harvest had jumped to about 41 million (Ruos and Tomlinson 1968), and the most recent estimate places the figure at 49 million (Keeler 1977).

Two methods were used in the present study to derive the CMU harvest figure. The first was a compilation of individual State estimates from random card surveys of small

game license holders (Table A-2). Since Arkansas did not conduct such a survey, the Arkansas harvest was arbitrarily computed as an average of the combined Missouri and Oklahoma harvests. The second method was to multiply the most recent U.S. harvest figure of 49 million by 0.30, the CMU proportion of the total harvest, as determined by Ruos and Tomlinson (1968). We conclude that the annual CMU mourning dove harvest is probably between 12 and 14.7 million birds. Numbers of mourning dove hunters in the CMU during the same time period probably exceeded 600,000 annually.

Latin America. – The extent of the mourning dove harvest in Mexico and Central America is unknown. However, because of the large numbers of recoveries obtained there (1,944), it is suspected that Latin America might account for a significant proportion of the continental harvest. This proportion will undoubtedly increase as the emerging countries become more affluent and as tourism expands through more efficient transportation.

Hunting Regulations

Hunting regulations directly affect the numbers of mourning doves harvested as well as the temporal and geographical distribution of the recoveries. Thus, the types and timing of hunting regulations in effect during the banding and recovery periods are important to interpretation of the data contained herein.

United States. – Federal frameworks establish the maximum limits under which annual migratory bird-hunting regulations may be set in the United States. State regulations may be more restrictive but not more liberal than the limits prescribed by the Federal frameworks. During the study period, Federal frameworks allowed mourning dove seasons of 70 half days in the EMU, 60 full days in the CMU, and 50 full days in the WMU within the 4½-month period of 1 September to 15 January. Daily bag limits were 10 or 12, and possession limits after the first day were twice the daily bag limit (in the EMU, an 18-bird limit was allowed for a special study in 1969 and 1970).

In the CMU, 10 of 14 States selected mourning dove seasons during all or some of the years of the study period (Table A-3). Three States had full or abbreviated seasons as follows: South Dakota, 5–17 days in September during 1967–72; Wyoming, 16–30 days in September during 1973–76; and Nebraska, 30–45 days in September and October during 1975–76. Montana, North Dakota, Minnesota, and Iowa elected to have no dove-hunting seasons whereas Missouri, Kansas, Colorado, New Mexico, Oklahoma, Arkansas, and Texas chose maximum or near-maximum seasons within the frameworks throughout the study period. Four of the hunting States (Missouri, Arkansas, New Mexico, and Texas) split their seasons during part of the study period; this action allowed an early harvest in September and/or October and a delayed harvest November through January. Texas was allowed to set separate seasons in each of two zones (north and south).

Latin America. – In Mexico, hunting seasons are delimited annually in the "Diario" or Federal Register, but they vary widely from year to year. In addition, regulations can be changed at any time during the season by special decree of the Director General of their Federal Wildlife Department. Only in the past few years has Mexico begun to enforce its game laws and regulations. Mexican dove-hunting seasons varied widely during the study period (Table A-4). Generally, during 1967–70 hunting seasons for mourning doves began in the northern part of the Republic in August and ended 31 October. The rest of the country initiated dove seasons either in October or November and the seasons continued through at least December. During 1971 and 1972, the seasons began early (1 August and 1 September, respectively) and ended 28 February throughout the Republic. In 1973–74 the seasons began 1 November and ended 28 February throughout Mexico, except for a long season in the northwest. During 1975–77 some seasons began early and continued through February and March. However, the State of Jalisco (an important harvest area) opened somewhat later each year. The inconsistency of hunting season dates throughout Mexico made analysis of migrational chronology in our study difficult.

Daily bag limits in Mexico varied between 10 and 15 birds except that 5 and 20 were allowed on weekends during some years. Possession limits were not imposed until 1975 when a 30-bird limit was established. In 1977 foreign hunters could legally export 60 mourning doves as well as the possession limits of other game birds (e.g., 60 white-winged doves, *Zenaida asiatica*).

Hunting seasons in Central America were poorly defined or nonexistent. Central American countries generally did not establish mourning dove seasons during the study period.

Central Management Unit Preseason Banding Program

During the early 1960's, preliminary analysis of existing mourning dove banding data revealed a need for larger and more representative banding samples from throughout the United States. The U.S. Fish and Wildlife Service, working with the respective Management Unit Dove Technical Committees, planned a comprehensive nationwide mourning dove banding program in 1966. The program was designed to improve quality and distribution of dove banding throughout the country. Originally scheduled for 5 years beginning in 1966, the study was delayed and extended because several States could not participate initially or fully. The banding effort therefore eventually covered 9 years from 1967 through 1975 (1967–74 in the CMU).

Annual banding quotas were established as guidelines for all participating States (R. K. Martinson, unpublished re-

ports). The annual United States quota was set at about 175,000 and each State was to contribute about 3,000–5,000 bandings each year (smaller eastern States had quotas of only 250 bandings and California and Texas had highs of 8,000). Instructions to State agencies stressed the need for wide distribution of banding effort according to physiographic stratification throughout each State. No more than 500 birds were to be banded in any one area.

The CMU banding effort was coordinated through the Central Migratory Shore and Upland Game Bird Technical Committee, an auxiliary of the Central Flyway Council. The banding effort was cooperatively undertaken by both State and Federal banders; some private banders participated. Much of the banding effort by State fish and wildlife agencies was supported by contracts issued under the Accelerated Research Program for Migratory Shore and Upland Game Birds (Sandfort 1977:2) and by Federal Aid to Wildlife Restoration.

Objectives of Banding and Underlying Assumptions

Banding, the marking of animals to allow identification of individuals, provides a means for obtaining data about the characteristics and dynamics of a population.

- The *direct recovery rate* provides an index to shooting pressure.
- The recovery rate, when adjusted by the reporting rate, provides an estimate of the *harvest rate*, or the proportion of the banded cohort which is harvested and retrieved by hunters.
- The harvest rate, when adjusted by crippling loss, provides an estimate of the overall *kill rate*.
- The *distribution of recoveries* indicates location and relative harvests by geographical areas and time periods for specific banding areas.
- The *derivation of recoveries* depicts the banding origin of birds harvested in specific recovery areas. When weighted by population information, the relative importance or contribution of each banding location to a recovery location can be calculated.
- The band recovery pattern, although emphasizing harvest aspects, is an indirect indicator of *geographical and temporal migratory patterns*.
- Estimates of *annual survival* can be calculated from the number of birds banded and the temporal distribution by year of subsequent recoveries.
- Indirect estimates of *population size* existing at the time of banding may be calculated from band recovery, band reporting rate, and harvest data.

Inasmuch as banding is a sampling technique, it is important that the marked or banded sample be representative of the overall population being studied. To be representative, birds must be banded uniformly throughout their range, by time periods, and according to age and sex. For the CMU mourning dove banding program, planners sought to distribute the banded sample evenly throughout the doves' range, to capture birds during the breeding season so as to establish their points of origin, and to obtain adequate samples of each age and sex class. These objectives were basically met by following guidelines established by the cooperative banding program described earlier. However, because of monetary and time restraints, banders were not always able to evenly distribute bandings geographically, chronologically, and by age and sex classes. Therefore, some of the conclusions presented herein for some States are biased toward certain areas of origin, time periods, or age and sex cohorts depending on trapping efforts within those States.

To reduce trapping effort bias among banding States, the recovery data were weighted by population and banding statistics when calculating derivation of the harvest. This practice not only corrected for disproportionate sampling of population components but also for differences in the sizes of the sampled populations and allowed comparison of the relative contributions of originating populations in specific harvest areas.

Certain assumptions which may or may not be true have to be made when analyzing banding data. In this analysis, the following assumptions were made:

- That bands placed on doves were retained by them throughout their life span. This assumption is probably correct.
- That birds banded during June–August represent breeding adults or young reared in the vicinity of capture. Available evidence indicates that this assumption is not entirely correct; some birds may be migrating during this period and therefore trapped away from their site of origin.
- That the various age and sex cohorts are trapped (sampled) in the same proportion as that of the population. This assumption is important when combining data because if one age or sex component is sampled disproportionately, the combined data could mislead the analyst about characteristics of the entire population.
- That banding samples are large enough to minimize the importance of sampling error. For computations on a Statewide or larger basis, this assumption is probably met for this analysis.
- That reporting rate of recovered bands is uniform among States in the United States. This assumption is incorrect to an unknown degree. Two studies (Tomlinson 1968; Reeves 1979) shed some light on this problem, but their data are insufficient to allow assignment of reporting rate values by State of recovery. Therefore, an average figure is arbitrarily used herein. Reporting rate for recoveries in Mexico was estimated according to Reeves' (1979) data.
- That doves banded in different areas of a particular State have the same migrational tendencies. This assumption is also basically incorrect because doves are influenced

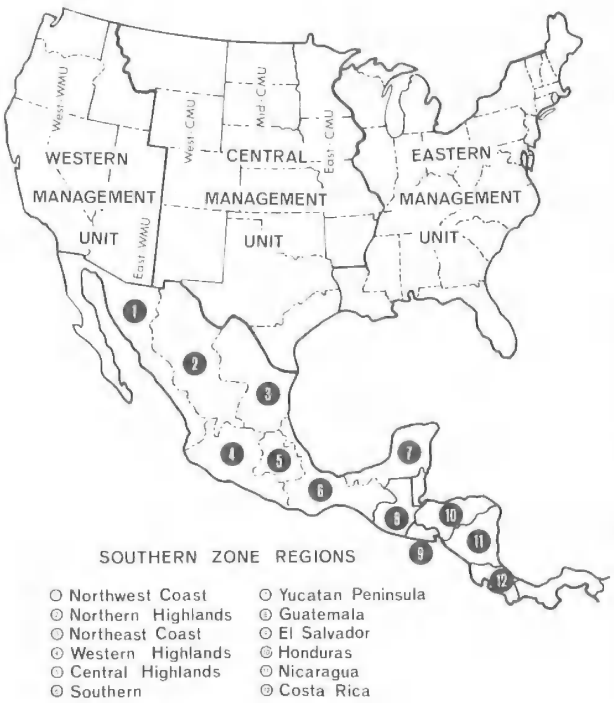


Fig. 13. Geographical reference areas.

by physiography rather than political boundaries. Because bandings were fairly well distributed within States of the CMU, it is believed that the resultant recoveries grossly reflect distribution of harvest from each State.

• That the pattern of direct recoveries is representative of the migrational distribution of the populations from the banding areas. Strictly speaking, this pattern reflects only distribution of hunting harvest because all of the recoveries are from hunters or hunting activity. However, because hunting is allowed rather uniformly throughout the migrational corridors, this assumption is basically correct.

In addition, there are several assumptions connected with the stochastic models used in this analysis to determine survival and recovery rates. These assumptions are discussed thoroughly by Brownie et al. (1978:6) and will not be repeated here.

Objectives of the Central Management Unit Banding Analysis

The main objective of this treatise is to provide an in-depth analysis of the distribution, derivation, chronological migration, harvest rates, survival rates, and other population variables of mourning doves in the CMU. An early decision was made to confine the analysis to geographical units no smaller than States (with the exception of Texas). This treatment allows the reader to view mourning dove population dynamics on a broad State-by-State or regional basis and should enable wildlife agencies to make sound decisions for management of mourning doves in the CMU.

We believe that this analysis will stimulate additional research in greater depth. Indeed, the abundance of information contained in the many tables and figures provides the opportunity to examine the data in more detail for local problem solving. In addition, our files contain the primary and secondary data treatment which could not be formally presented in this analysis because of space limitations. This information can also be made available in tabular form to interested researchers upon request. It is recognized, however, that some managers will need even more precise data from specific areas. This being true, we encourage researchers to request data in the form needed from the Bird Banding Laboratory (BBL), Laurel, Maryland.

Conclusions, based on the analysis, have been made about specific and general aspects of dove population dynamics to help the reader interpret the presented data. However, management implications and recommendations purposely have been omitted to allow the reader the freedom to make his own decisions in this regard.

Methods

Reference Areas

Banding and subsequent encounter locations originally were identified by coordinates of latitude and longitude. However, except for a summary of banding distribution (Fig. 8), data for all coordinates have been grouped for this analysis. Several artificial reference areas of the United States and Latin America were adopted to describe recovery and migrational patterns of mourning doves. The major regions in the United States were the three management units—Eastern, Central, and Western (Fig. 3). These units were further divided into north-south oriented tiers that contained similar dove migration patterns. This resulted in the division of the WMU into two tiers and the CMU into three tiers. The EMU was not divided because of its small contribution to the dove harvest in the CMU and Latin America. The tiers are herein referred to as West-WMU, East-WMU, West-CMU, Mid-CMU, East-CMU, and EMU (Fig. 13). States were retained as the smallest geographical entities except for the division of Texas into north and south zones. The two Texas divisions are treated as separate reference areas to differentiate the data according to the independent hunting regulations in each zone.

Mexico and Central American countries are collectively referred to as the Southern Zone. This zone was arbitrarily divided into 12 geographical regions (Table A-5 and Fig. 13). These divisions allowed grouping of Mexican States into areas with similar physiographic features and band recovery patterns. Except for Belize (which was in-

cluded in Region 7), each Central American country was considered as a separate region. These regions and their corresponding identification numbers are referred to throughout the text.

Trapping and Banding

Although doves were captured in a variety of ways, most were taken in wire-mesh funnel traps baited with small grain (Reeves et al. 1968). Selected areas were prebaited with grains such as sorghums, cracked corn, wheat, and millet, and funnel traps were set after doves were attracted to the areas. Traps were checked frequently to empty them for additional birds and to prevent mortality from predation and exposure. Banders were encouraged to distribute their trapping activities intermittently throughout the 3-month period of June–August and over wide geographical areas. Trapping was generally terminated at least 10 days before the hunting season which usually began in early September. Some trapping, however, continued throughout August, especially in non-hunting States.

Trapped mourning doves were banded with standard U.S. Fish and Wildlife Service number 3A aluminum leg bands. Data on sex, age, date of capture, location of capture, and band number were recorded and submitted later on banding schedule forms to the BBL where they were stored in computer data banks for later retrieval.

Age and Sex Classification

Banders used several criteria in determining the age (immature or adult) and sex of doves captured. Immature doves were distinguished from adults by the presence of white or buffy coloration of the tips of primary and primary covert wing feathers until they had completed their post-juvenal molt. When wing feathers had been replaced completely by adult plumage during the progression of molt – usually in late summer – captured doves were recorded as "age unknown" when banded. Adult doves were classified as to sex by differences in the coloration of crown and breast plumage. Males generally have bluish crowns and pink breasts, whereas females have gray or brown crowns and tan breasts. The diagnostic sex characters of immatures are generally not developed sufficiently to allow sex identification – thus, all captured immatures were recorded as "unknown sex." Sometimes adults also exhibited uncertain external sexual characteristics, and they too were recorded as unknown sex. Details on methods for ascertaining age and sex of mourning doves captured during the summer are described by Reeves et al. (1968).

Data Extraction

Data used in this analysis were extracted in the fall of 1977 from the banding and recovery retrieval files maintained by the U.S. Fish and Wildlife Service's BBL at Laurel, Maryland. These files are described in detail in Part 6 of Volume 1 of the North American Bird Banding Manual (U.S. Department of the Interior and Canada Department of Environment 1972, 1977). The BBL's retrieval files are updated annually in early autumn and include nearly all band recovery data through the previous hunting season. Thus, recoveries of doves banded in the CMU were available through the 1976–77 hunting season, the third hunting season following the last year of the cooperative preseason banding in CMU. Banding records for the EMU and WMU and recoveries in the CMU, Mexico, and Central America were also extracted. Records were placed on magnetic tapes for further editing and reformatting, and for tabulation and calculation.

Data Criteria, Reformatting, and Tabulations

Data used in the analysis were selected by criteria specified in Table A-6. Our objectives were to identify for analysis those data that were (1) pertinent to bandings and resultant recoveries of mourning doves marked in the CMU during preseason banding periods of 1967–74, and (2) all recoveries in the CMU and the Southern Zone of doves banded in the EMU and WMU during 1967–75. Only records of "normal wild" banded and recovered doves were sought as only they would represent characteristics of the CMU mourning dove population to be studied.

In the extractions from the retrieval files, all "How Obtained" code records initially were examined to determine the proportion of recoveries that resulted from hunting related activities. Recoveries that had been assigned to four "How Obtained" codes (00, 01, 56, and 98 and presumably related to hunting activities) made up 97.5% of all recovery records (Table A-7). For doves recovered in the Southern Zone during 1 August through 31 May, all "How Obtained" records were retained for analysis; non-hunting related records were deleted for birds recovered during 1 September through 31 January in the United States.

The "Who Reported" code categorizes the identification or affiliation of the individual who reported the band to the BBL. Of the total recoveries, 69% were reported by the person (or a close personal associate) who actually found or shot the banded dove, and 27% were reported by conservation agency personnel. All "Who Reported" codes were used in the analysis.

The "Why Reported" code identifies the impetus or cause that led to the band being reported. Ninety-three percent of all recoveries were reported as a result of a voluntary action, whereas 4% were coded as resulting from solicited reporting. Recoveries representing all "Why Reported" codes were retained for the analysis.

Recoveries of birds banded in the CMU and recovered anywhere were retained if the State or foreign country was

known. Bands recovered in Texas were further designated by either North or South Texas. In addition, all recoveries of birds banded outside of the CMU during the specified years but recovered either in the CMU or in Latin America were also used in the analysis. Locations of banded birds recovered in Mexico were further identified by Mexican State of recovery.

The banding and recovery data were reformatted to facilitate their analysis. Major steps included (1) changing locations of banding and recovery from the waterfowl flyway orientation of the original files to mourning dove management unit orientation, (2) realigning States within the mourning dove management units and nations south of the United States from an alphabetical order to a north to south orientation, and (3) establishing major and minor time periods of band recovery. These procedures generally followed those outlined by Reeves and Fiehrer (unpublished report).

The final edited and reformatted records were then subjected to programs in the EDP system noted above. Output was on computer printouts, which provided data directly useful for analysis or source data for additional analysis. To illustrate the latter, banding and recovery matrices from the Laurel tabulations were analyzed by the Texas Parks and Wildlife Department in Austin, using various new statistical methods developed for estimating survival rates. A few other special tabulations not in the above EDP system were produced to show the number of doves banded in non-CMU States during the study period, and to show the band recovery distribution in Mexico by Mexican State. The 50-odd computer-produced tabulations comprising the foundation for this study are filed in the Office of Migratory Bird Management, Laurel, Maryland, for future reference.

Data Limitations

At least four weaknesses are inherent in mourning dove banding data:

(1) Few mourning doves were banded in Canadian areas north of the CMU during the study period. We elected to exclude these Canadian records from the analysis. Therefore, not all segments of the migrating mourning dove population in the CMU were represented by banded samples. In addition, Mexico's breeding population of mourning doves was not sampled. Thus, all discussions in this analysis of distribution or derivation of doves in Mexico and Central America stem from birds banded in the United States.

(2) Species with low recovery rates and relatively low survival rates (such as mourning doves) do not readily lend themselves to banding studies because of the large sample sizes necessary for analysis. Although more advanced than earlier methods (Brownie et al. 1978:17; Anderson and Burnham 1976:12), the stochastic models used in our analysis were limited in their ability to provide mourning dove survival and recovery rate estimates with acceptable precision because of the stringent requirements of the models. The banded samples by age and sex for some States were marginal or inadequate for computation of survival and recovery rates. This situation necessitated pooling of data for the management unit as a whole and tended to mask some of the individual variation by State.

(3) Not all hunters report all banded doves they encounter. Furthermore, this reporting rate is not equal in all areas where dove bands are recovered (Tomlinson 1968). Although a reward band study was undertaken to determine reporting rates during the CMU banding program, the reliability of the derived band reporting estimates is questionable (see discussion in Reeves 1979). An average reporting rate of 45% was arbitrarily used in this analysis unless otherwise stated.

(4) The absence of a nationwide hunter and harvest survey restricts the application of data derived from the banding analysis. In this analysis, we summarized State-obtained harvest data when practicable and estimated harvest when that figure was not available from the State (e.g., Arkansas). As a result, projected preseason population estimates are subject to considerable error.

Representativeness of Doves Banded

One of the fundamental assumptions underlying all analyses of banding data is that the marked animals are representative of the population from which they come. This assumption may be violated in the present analysis for reasons discussed below.

The preseason banding period of June through August was selected to ensure that trapped doves were either nesting adults or immatures hatched in the sampled area. If there was substantial movement into or away from specific areas, representativeness of the banded sample would be compromised. Movement into and out of areas most logically would occur among early-hatched immatures, if it occurred at all.

Although the banding period was 3 months long, it was assumed that recovery patterns of birds banded early in the banding season were similar to those banded late. The validity of this assumption was determined by testing the hypothesis that proportions of in-State to out-of-State direct recoveries were similar throughout the banding period. Data within each hunting State were examined separately by using the G-test (Sokal and Rohlf 1969:599–600). Data for immature (Table A-8) and adult (Table A-9) doves were tested separately.

No chronological differences in proportions of in-State to out-of-State direct recoveries ($P > 0.05$) were detected among 10-day periods for immature doves banded in Colorado, Kansas, North Texas, and South Texas. Differences ($P < 0.05$) were detected for South Dakota, Missouri, New Mexico, Oklahoma, and Arkansas where immatures banded late had a higher proportion of in-State recoveries (Table

A-10). In South Dakota, differences were detected among three time periods, whereas a difference between only two (early and late) periods was detected in the other States. Thirty-nine percent of the direct recoveries of immature doves banded in South Dakota from 1 June through 10 July occurred in-State whereas 56 and 66% of birds banded during 11–31 July and 1–31 August, respectively, were recovered in-State. These data suggest that in some States early-banded immatures depart natal areas before late-banded immatures. Thus, some early-hatched immatures could be banded in States other than those in which they were hatched.

No chronological differences ($P > 0.05$) were detected among 10-day periods for adult doves in any State except for South Dakota where an increase ($P < 0.05$) in the proportion of in-State recoveries for 11–31 August was detected. This increase was based on 17 recoveries and is not conclusive evidence that early-banded adults depart natal areas differently from late-banded adults.

These findings demonstrate a potential bias in the overall analysis, particularly for doves banded as immatures. Since early-banded immatures may migrate earlier than late-banded immatures, a basic assumption underlying this analysis is violated. Distributional and derivational patterns may have been influenced by time periods in which most birds were banded. Those immatures that have left their natal areas during the banding period could be trapped, banded, and assumed to be part of the population in the capture area. This problem could be especially severe if most immatures were banded late in the season. Data related to banding success by 10-day periods were not extracted. However, numbers of recoveries by 10-day periods (Table A-11) provided an indirect means of determining trapping success. For adult doves banded in the CMU, higher proportions of direct recoveries came from birds banded early in the preseason period (48% in June). However, for immatures the distribution of recoveries was reversed. Nearly 62% of recoveries from immatures came from birds banded after 20 July; 44% came from doves banded during August. Therefore, since a high proportion of recoveries of immatures came from birds banded late in the season, the banded sample of immature doves in this study may not reflect true areas of origin.

Imprecise Indirect Band Recoveries

When a band is reported to BBL without any reference as to when the bird was killed and such information cannot be obtained, the computer code for hunting season survived becomes "99," which means the year of recovery is unknown. Due to the computer program instructions developed for this analysis, such recoveries were tallied as indirect recoveries. Since some of these recoveries are obviously direct recoveries (i.e., the postmark date of the reported band is during the first hunting season after banding), the ratios of direct to indirect recoveries are slightly skewed to favor indirect recoveries. About 3.4% (307) of the 9,091 recoveries of doves banded in the CMU were coded as unknown year of recovery. This aberration is especially acute when indirect recoveries in Mexico and Central America are being considered since many recovery reports from these areas are incomplete. For instance, Mexico accounted for only 15% (1,386) of the total recoveries (9,091), but 59% (180) of the possible erroneous recoveries that were included with the indirect recoveries. Caution should be used when comparing direct and indirect recovery rates, particularly when recoveries in Latin America are involved.

Analytical Procedures

Analytical procedures are discussed in the sections of the text where such computations were applied. Statistical differences are considered to be significant when $P < 0.05$.

Results

Banding Accomplishments

Over 868,000 mourning doves were banded throughout the United States during the preseason banding periods between 1967 and 1975 (Table A-12). Recoveries used in this analysis were from (1) doves banded in the CMU and recovered anywhere and (2) doves banded in the EMU and WMU and recovered in the CMU and the Southern Zone. There were 9,822 recoveries in the selected areas of reference (Fig. 14). Of the 447,883 bandings in the EMU, 357 were recovered in the CMU and 52 in the Southern Zone. For the WMU, 88,540 bandings produced 24 recoveries in the CMU and 298 recoveries in the Southern Zone. In the CMU, 332,314 doves were banded; of these, 6,972 birds were recovered in the CMU, 398 in the EMU, 131 in the WMU, and 1,590 in the Southern Zone. These figures support Kiel's (1959) contention that doves originating in a specific management unit tend to remain in the unit.

In the CMU, bandings were distributed fairly evenly by year and by State of banding (Table A-13). Yearly bandings ranged from a low of about 25,000 in 1968 to a high of 53,000 in 1972. Total bandings by State ranged from a low of about 7,000 in Wyoming to a high of 48,000 in South Dakota. The bandings were also fairly well distributed geographically, although the western part of the unit was sampled less heavily than other areas (Fig. 15).

Of the 332,000 CMU bandings, 182,000 were of immature doves and 150,000 of adults. Less than 5,000 adults (3%) were recorded as sex unknown because of indistinct plumage characters. Of the 146,000 adults whose sex was determined, the sex ratio was heavily weighted toward males (187:100). Although it is now believed by some investigators (Baskett et al. 1978; Sayre et al. 1980) that males

Fig. 14. Numbers of mourning dove bandings and recoveries used in the Central Management Unit banding analysis.

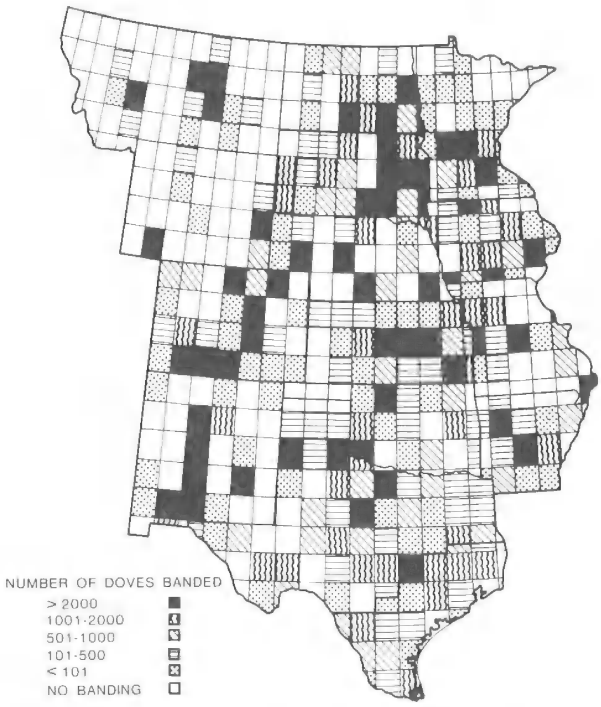


Fig. 15. Distribution of Central Management Unit mourning dove bandings by 10° block.

outnumber females in wild populations, the sex ratio of the trapped sample in this study was probably biased toward males because (1) much of the trapping success occurred during morning hours and late evening hours when adult males were free from nest duties and (2) most birds classified as unknown sex probably were females. Despite these influencing factors, the number of male mourning doves probably exceeds that of females.

The overall age ratio of the trapped sample was 121:100, immatures to adults. This ratio is low and probably not representative of the true age ratio of the preseason population because some trapping was done each year before substantial numbers of young had been produced. Other possible causes for the relatively low proportion of immatures include differential vulnerability to trapping and differential movements.

Distribution of Band Recoveries

Band recoveries from migratory game birds reflect harvest patterns during hunting seasons which, in turn, reflect migration patterns. Distribution of band recoveries from mourning doves banded in the CMU were tabulated by five age and sex categories (immatures, adult males, adult females, all adults, and total doves) and two recovery categories (direct and indirect). The resulting 20 tables illustrate the harvest locations by numbers of doves (Tables A-14 to A-23) and by their percentages (Tables A-24 to A-33).

The percentages in Tables A-24 to A-33 require further clarification. For a particular State of banding, these data are straightforward and precise. However, the reader is cautioned that direct comparison of distribution patterns between adjacent banding States in these tables can be misleading because some States allowed hunting during the study and others did not. For banding States that allowed hunting, there is a disproportionately high in-State recovery which affects the proportions of birds recovered in other States. As an example, comparison in Table A-28 of the recovery proportions in Texas from North Dakota (nonhunting) and South Dakota (hunting) would show 41 and 17%, respectively. One could erroneously infer that proportionately more doves from North Dakota migrated to Texas than those from South Dakota. To correct for this problem, we chose to express distribution patterns through relative recovery rate indices (Tables A-34 to A-36). This treatment of the data projects the approximate probability of an individual bird being recovered in specific areas and allows for quick comparisons among States.

The distributional analysis was restricted to direct recoveries because these records best reflect migratory pathways from specific breeding areas. Use of indirect recoveries could be misleading because some doves do not return from southern wintering sites to their natal or prior breeding areas; subsequent recoveries would thus reflect distribution of some birds from entirely different areas than those in which they were banded.

Distribution from Central Management Unit States (All Doves)

Direct recovery data for all doves have been combined to illustrate general distribution from each CMU State. The information in this section is summarized in Tables A-18 and A-28 and pertains to direct recoveries only.

Central Management Unit – General

Of the 332,314 bands placed on doves in the CMU during the study period, 5,266 direct recoveries were obtained. Of these, 4,134 (79%) were made in the CMU, 292 (6%) in the EMU, and 48 (1%) in the WMU. The Southern Zone accounted for 792 (15%) of the recoveries; Mexico reported the most (695, 13%). Birds banded in Montana had the lowest proportion of recoveries taken in the CMU (39%) and those from Arkansas and South Texas had the highest (94%).

Montana. – Slightly more than 13,000 mourning doves were banded. Because hunting was not allowed in the State throughout the period, all 97 direct recoveries of doves banded in Montana were from outside the State. Thirty-nine percent of the recoveries were from other States of the CMU, chiefly Colorado (22%) and New Mexico (10%); 17% were from the WMU, mainly California (7%) and Arizona (5%). The largest proportion of recoveries from Montana occurred in Mexico (43%), especially in the Western Highlands (39%). Only one recovery was made south of Mexico (Guatemala).

North Dakota. – Over 15,000 mourning doves were banded, from which 121 direct recoveries were reported. Hunting also was not allowed in North Dakota during the study period and recoveries were all from out of State. Over half of the recoveries were reported from other reference areas of the CMU, particularly North Texas (24%) and South Texas (17%). Nearly 40% of the recoveries of birds banded in North Dakota came from the Southern Zone (Mexico 27% and Central America 10%). The Western Highlands of Mexico constituted a particularly important recovery location (21%), but birds were also recovered in four Central American countries (Guatemala 4%, El Salvador 3%, Honduras 1%, and Nicaragua 3%). Less than 8% of the recoveries came from the EMU (6%) and the WMU (2%) combined.

Minnesota. – Minnesota also was a non-hunting State during the study. More than 25,000 doves were banded from which 271 out-of-State recoveries were reported. About 44% of these recoveries came from other areas of the CMU, principally North Texas (16%) and South Texas (23%). Equal proportions of birds banded in Minnesota were recovered in the EMU (26%) and Mexico (26%). Principal EMU States of recovery were Louisiana (11%) and Florida (5%); in Mexico, the Western Highlands were important (20%). Less than 4% of the recoveries were reported from Central America, but they came from four different countries.

South Dakota. – More doves (nearly 48,000) were banded in South Dakota than any other CMU State during the study period. Dove hunting seasons were permitted during 1967–72 but not during 1973–74. Despite the two non-hunting years, 564 (62%) of the 917 direct recoveries were reported from South Dakota. Other CMU reference areas accounted for 21% of the recoveries (North Texas 8%, South Texas 9%, New Mexico 2%, Kansas 1%, all others 1%). The Southern Zone was an important harvest area (15% of the recoveries). Mexico accounted for 13% of the total, mainly in the Western Highlands (11%), and five Central American countries tallied a combined 2%. The EMU, particularly the Gulf Coast States, was responsible for 2% of the recoveries from South Dakota, whereas the WMU had less than 1%.

Wyoming. – Wyoming had open hunting seasons on mourning doves during 4 of the 10 years of the study (1973–76). About 7,000 birds were banded from which 39 were direct recoveries, only 4 (10%) of which were taken in Wyoming. The two CMU States directly south of Wyoming accounted for 23% of the recoveries (Colorado 10%, New Mexico 13%) and Mexico accounted for nearly half, specifically the Western Highlands (36%) and the Northwest Coast (10%). About 10% of the recoveries were reported from the WMU.

Nebraska. – Over 26,000 mourning doves were banded and 171 were reported as direct recoveries. Since this State did not allow mourning dove seasons during 1967–74 (the banding period), all direct recoveries were taken out of State. Nearly half of these recoveries were reported from other CMU States, particularly Texas (North and South Texas, 21% each); 2% were taken in the EMU. The Southern Zone was an important harvest area with 44% of the recoveries reported from Mexico and 6% from Central America. The Western and Central Highlands areas of Mexico accounted for 37 and 4%, respectively.

Iowa. – About 24,000 mourning doves were banded and 204 direct recoveries were reported. All recoveries were from out of State since Iowa also allowed no hunting of doves during the study period. Over half of Iowa's recoveries (51%) were reported from other CMU States; most of these were from Texas (North Texas 20% and South Texas 24%). Other prominent CMU recovery States were Missouri, Oklahoma, and Arkansas (5% combined). The EMU was an important harvest area for birds banded in Iowa, accounting for nearly 30% of the recoveries, particularly in Gulf Coast States (Louisiana 12%, Florida 6%, Alabama 4%, and Georgia 3%). The Southern Zone accounted for about 20% of the recoveries; the Western Highlands of Mexico (10%) and Guatemala (3%) were the most prominent.

Missouri. – About 21,000 mourning doves were banded. Hunting seasons were allowed throughout the period and 667 direct recoveries were obtained, of which 485 (73%) were taken in Missouri. Other reference areas in the CMU accounted for 8% of the recoveries, principally North Texas

(2%), South Texas (3%), and Kansas (2%). Only 3% of the recoveries were reported from the Southern Zone; Mexico's Western Highlands (2%) and Guatemala (<1%) were the most prominent. The EMU was the most important out-of-State harvest area for birds banded in Missouri (15% of the recoveries). Prominent EMU harvest States were Florida (4%), Louisiana (3%), Illinois (3%), Alabama (2%), and Georgia (2%).

Kansas. – Personnel in Kansas banded nearly 22,000 mourning doves from which 379 direct recoveries were obtained. Hunting was allowed throughout the period and 245 (65%) of the recoveries were from Kansas. Other States of the CMU accounted for 21% of the recoveries, principally North Texas (10%) and South Texas (9%). The Southern Zone accounted for the remaining 14%, particularly the Western Highlands of Mexico (8%), and Guatemala, Nicaragua, and El Salvador (each about 1%). No direct recoveries were reported in either the EMU or the WMU.

Colorado. – Colorado biologists banded over 29,000 mourning doves from which 283 bands were recovered. Hunting seasons were permitted throughout the study period and 146 (52%) of the recoveries came from Colorado. Other CMU States accounted for 16% of the recoveries (principally New Mexico 8% and North Texas 6%) and the WMU had 5% (mainly Arizona 4%). Except for one band in the EMU (Illinois), the remaining recoveries were taken in the Southern Zone (27%), mostly from the Western Highlands (20%) and Northwest Coast (3%) areas of Mexico.

New Mexico. – New Mexico also allowed hunting throughout the study period. Of over 26,000 doves banded, 202 were recovered, 130 (64%) in New Mexico. Except for North Texas (7%), South Texas (<1%), and Colorado (<1%), the rest of the recoveries were reported from the Southern Zone (27%). In Mexico, the Western Highlands (20%), Northwest Coast (4%), and the Northern Highlands (2%) were the most important harvest areas. No recoveries of doves from New Mexico were taken in the EMU or the WMU.

Oklahoma. – Slightly more than 16,000 mourning doves were banded. Open dove seasons were allowed throughout the period, and 179 (57%) of the 316 total recoveries were taken in Oklahoma. North Texas (22%) and South Texas (4%) were the other major CMU recipients of Oklahoma-banded doves. Only two bands (<1%) were recovered in the EMU (Louisiana) and none from the WMU. The Southern Zone accounted for 16% of the recoveries, principally in the Western (11%) and Central (2%) Highlands of Mexico.

Arkansas. – About 12,000 doves were banded. Arkansas also allowed dove seasons throughout the period and 363 bands (86%) of 422 were recovered in Arkansas, the highest in-State recovery percentage of any CMU reference area (except for Texas as one entity). Most of the remaining recoveries were reported from other CMU States (8%) and the EMU (5%). These recovery locations included North Texas (3%), Oklahoma (2%), Missouri (1%), South Texas (1%), Louisiana (2%), Alabama (1%), and Florida (1%). The Southern Zone reported less than 2% of the recoveries from doves banded in Arkansas.

North Texas. – Nearly 34,000 doves were banded. From these bandings, 840 recoveries resulted, 706 (84%) of which were taken in North Texas and 58 (7%) in South Texas. The Southern Zone accounted for most of the remaining recoveries (8%); the Western Highlands region of Mexico was the most prominent (6%). Less than 1% of the recoveries were reported from other CMU States, the EMU, and the WMU combined.

South Texas. – Nearly 13,000 doves were banded. Throughout the study period, South Texas allowed hunting seasons, usually during later dates (late September and October) than other CMU States. Of the 337 resulting recoveries, 287 (85%) were taken in South Texas and 26 (8%) in North Texas. Relatively small proportions of the South Texas bandings were taken elsewhere (2% in the EMU and 4% in the Southern Zone). Of these recovery locations, the Western (2%) and Central (1%) Highlands of Mexico and Louisiana (2%) were the most prominent.

Geographical Differences

Recovery Rate Index/Comparative Recovery Factors

Differences in distributional patterns among the various CMU States are apparent in the foregoing discussion. For purposes of directly comparing these patterns among geographical areas and between age and sex classes, recovery rate indices were developed (Tables A-34 to A-36). The recovery rate index is the direct band recovery rate multiplied by 10,000. Because recovery rate indices from all banding locations are on the same basis (i.e., recovery per 10,000 birds banded), comparisons may be made among different banding areas, recovery areas, and age or sex cohorts of the population sampled. These comparisons reflect the relative frequencies that banded doves were recovered in specific situations. For example, the recovery rate indices for immature doves banded in South Dakota and Missouri and subsequently recovered in Mexico are 40 and 10, respectively (Table A-34). Therefore, an individual immature dove banded in South Dakota is four times as likely to be recovered in Mexico as an immature dove banded in Missouri.

To illustrate differences in migratory tendencies of doves from several areas, comparative recovery factors (CRF's) were computed by dividing the lowest recovery rate index into each index of a series being compared. The CRF's thus represent the relative probabilities of recovery in a specified location or situation.

Tests for Independence

To determine if doves from all CMU States had similar

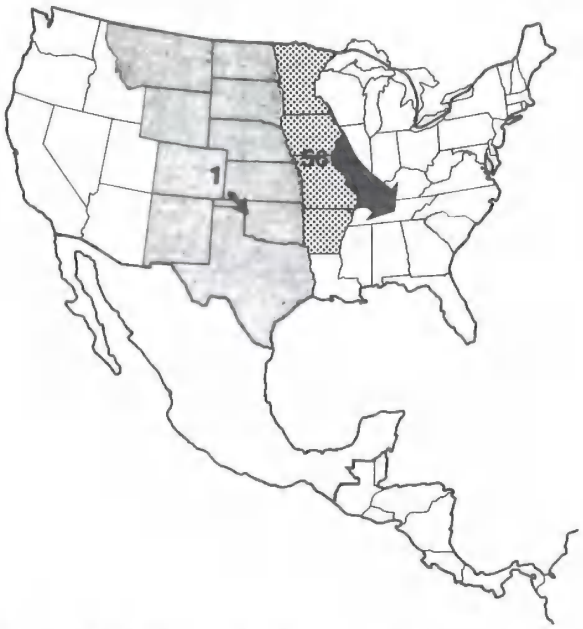


Fig. 16. Relative frequencies of recovery in the Eastern Management Unit for adult mourning doves banded in designated areas of the Central Management Unit. Example: An individual dove banded in Minnesota, Iowa, Missouri, or Arkansas is 56 times more likely to be recovered in the EMU than a dove banded in any of the remaining CMU States (56/1 = 56).

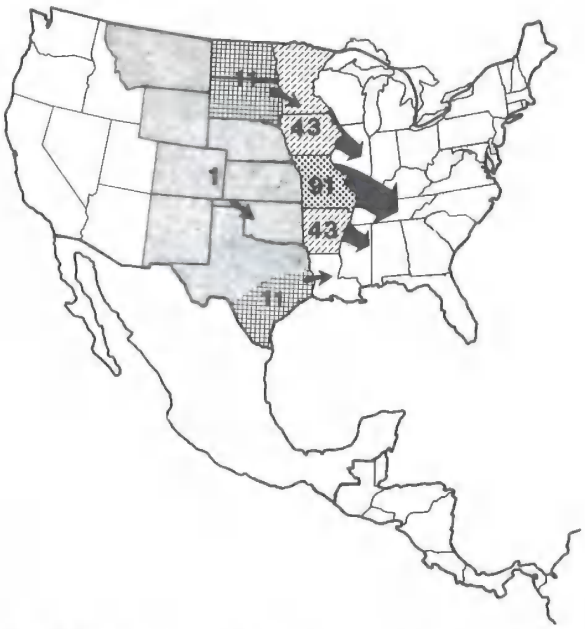


Fig. 17. Relative frequencies of recovery in the Eastern Management Unit for immature mourning doves banded in designated areas of the Central Management Unit. Example: An individual dove banded in Missouri is twice as likely to be recovered in the EMU as a dove banded in Minnesota, Iowa, and Arkansas (91/43 = 2.1).

probabilities of being recovered in a selected harvest area, we tested the recovery data for independence using the *G*-test (Sokal and Rohlf 1969). The data were separated for doves banded as adults (Table A-17) and immatures (Table A-14) in each of the 15 CMU banding States. Three discrete harvest areas (EMU, WMU, and Mexico) were examined. Previous testing indicated that recovery rates for adults were different from those for immatures; thus these data were not pooled.

For each of the 15 banding locations, the number of doves banded in relation to the number of doves recovered in a specified harvest area (the EMU, WMU, or Mexico) were used to test for independence. When differences were detected among banding States, the CMU was partitioned by inspection (*a posteriori*) into groups of States with similar dove recovery patterns. The pooled data for each partitioned area then were tested within and among areas. When these tests confirmed the integrity of the areas, combined recovery rate indices were computed for each. We then calculated comparative recovery factors using the banding area with the lowest recovery rate index as a factor of 1. The CRF values that were obtained reflect the relative frequencies at which doves from the banding areas were recovered in the specified harvest locations (Figs. 16–21).

Tendency for adult doves to migrate to the Eastern Management Unit. – The tests for independence of doves banded as adults and recovered in the EMU indicated two groups of banding areas that were similar within each group but different between the groups. The recovery rate index in the EMU for the eastern tier of CMU States (Minnesota, Iowa, Missouri, and Arkansas) was 14.48; and for the remaining CMU States (Montana, North Dakota, Wyoming, South Dakota, Nebraska, Colorado, Kansas, New Mexico, Oklahoma, North Texas, and South Texas), it was 0.26. The CRF's are 56 and 1, respectively, and therefore the odds were 56 to 1 that an adult dove from the eastern tier of CMU States would be recovered in the EMU over an adult dove from the remaining CMU States (Fig. 16).

Tendency for immature doves to migrate to the Eastern Management Unit. – The grouping of CMU States with doves demonstrating similar migrational tendencies to the EMU is more diverse when using data for doves banded as immatures. *G*-test results indicate four areas with distinct recovery rate indices (Fig. 17). The highest recovery rate index in the EMU was for immature doves banded in Missouri (67.32). For Minnesota, Iowa, and Arkansas, the recovery rate index in the EMU was 31.55; and for North Dakota, South Dakota, and South Texas, it was 7.96. The lowest recovery rate index in the EMU (0.74) was from doves banded in the remaining CMU States (Montana, Wyoming, Nebraska, Kansas, Colorado, New Mexico, Oklahoma, and North Texas). Thus, an immature dove banded in Missouri had the highest CRF (91); followed by Minnesota, Iowa, and Arkansas (43); North Dakota, South

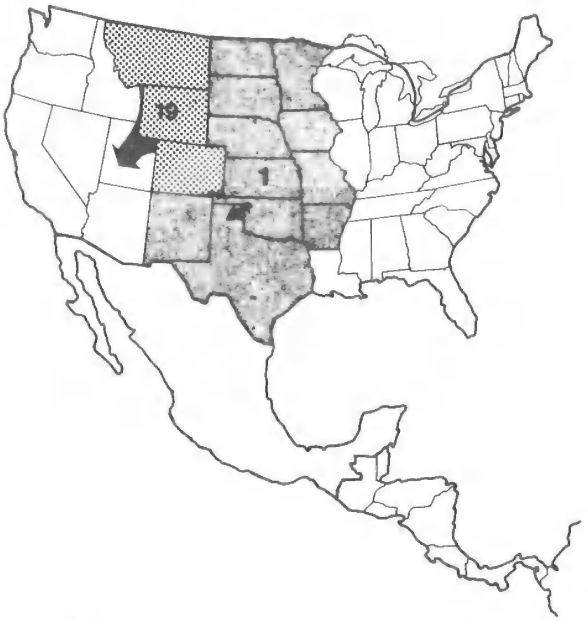


Fig. 18. Relative frequencies of recovery in the Western Management Unit for adult mourning doves banded in designated areas of the Central Management Unit. Example: An individual dove banded in Montana, Wyoming, or Colorado is 19 times more likely to be recovered in the WMU than a dove banded in any of the remaining CMU States (19/1 = 19).

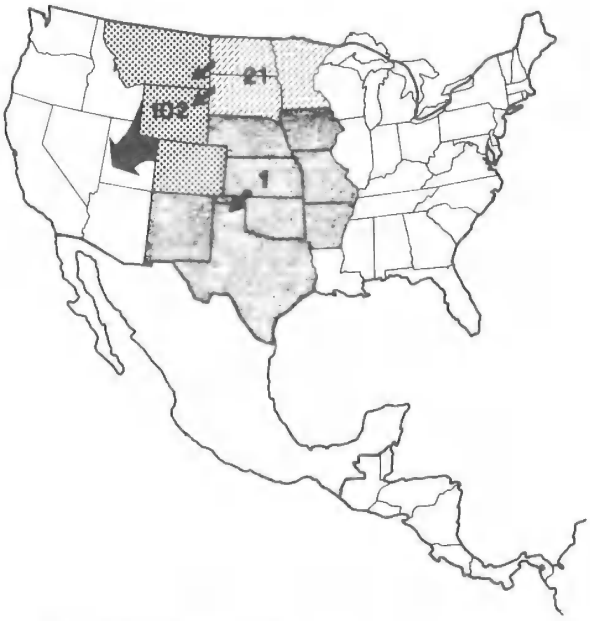


Fig. 19. Relative frequencies of recovery in the Western Management Unit for immature mourning doves banded in designated areas of the Central Management Unit. Example: An individual dove banded in Montana, Wyoming, or Colorado is five times more likely to be recovered in the WMU than a dove banded in North Dakota, South Dakota, or Minnesota (102/21 = 4.9).

Dakota, and South Texas (11); and the remaining CMU States (1).

An immature dove banded in Missouri was 2 times more likely to be recovered in the EMU than an immature dove banded in Minnesota, Iowa, and Arkansas; 8 times more likely than an immature dove banded in North Dakota, South Dakota, and South Texas; and 91 times more likely than an immature dove banded in the remaining CMU States (Montana, Wyoming, Nebraska, Kansas, Colorado, New Mexico, Oklahoma, and North Texas).

An immature dove banded in Minnesota, Iowa, and Arkansas was 4 times more likely to be recovered in the EMU than an immature dove banded in North Dakota, South Dakota, and South Texas; and 43 times more likely than an immature dove banded in Montana, Wyoming, Nebraska, Kansas, Colorado, New Mexico, Oklahoma, and North Texas.

An immature dove banded in North Dakota, South Dakota, and South Texas was 11 times more likely to be recovered in the EMU than an immature dove banded in Montana, Wyoming, Nebraska, Kansas, Colorado, New Mexico, Oklahoma, and North Texas.

Tendency for adult doves to migrate to the Western Management Unit. – The tests for independence of doves banded as adults in the CMU and recovered in the WMU indicate two groups of banding locations with different recovery patterns in the WMU (Fig. 18). For the northwestern tier of CMU States (Montana, Wyoming, and Colorado), the combined recovery rate index was 4.28; for the remaining CMU States, it was 0.23. Thus, an adult dove banded in Montana, Wyoming, and Colorado was 19 times more likely to be recovered in the WMU than an adult dove banded in the remaining CMU States.

Tendency for immature doves to migrate to the Western Management Unit. – The CMU States (Montana, Wyoming, and Colorado) with the highest probability for doves banded as immatures to be recovered in the WMU were the same as for adults (Fig. 19). This northwestern tier of CMU States had a combined recovery rate index of 9.20 (CRF = 102). The remaining CMU States were divided into two groups. The northern States (North Dakota, Minnesota, and South Dakota) had a combined recovery rate index of 1.87 (CRF = 21), and the remaining area (Nebraska, Iowa, Missouri, Kansas, New Mexico, Oklahoma, Arkansas, North Texas, and South Texas) had an index of 0.09 (CRF = 1). Thus, an immature dove banded in Montana, Wyoming, and Colorado was 5 times more likely to be recovered in the WMU than an immature dove banded in North Dakota, Minnesota, and South Dakota, and 102 times more likely than an immature dove banded in the remaining CMU States. An immature dove banded in North Dakota, Minnesota, and South Dakota was 21 times more likely to be recovered in the WMU than an immature dove banded in Nebraska, Iowa, Missouri,

Fig. 20. Relative frequencies of recovery in Mexico for adult mourning doves banded in designated areas of the Central Management Unit. Example: An individual dove banded in Missouri, Arkansas, or South Texas is eight times less likely to be recovered in Mexico than a dove banded in any of the remaining CMU States (8/1 = 8).

Fig. 21. Relative frequencies of recovery in Mexico for immature mourning doves banded in designated areas of the Central Management Unit. Example: An individual dove banded in Iowa, Missouri, Arkansas, or South Texas is three times less likely to be recovered in Mexico than a dove banded in any of the remaining CMU States (3/1 = 3).

Kansas, New Mexico, Oklahoma, Arkansas, North Texas, and South Texas.

Tendency for adult doves to migrate to Mexico. – Adult doves banded in each of two groups of CMU States had a different likelihood of being recovered in Mexico. No differences were detected for Missouri, Arkansas, and South Texas as a group, nor for the remaining CMU States as a group. The combined recovery rate index for Missouri, Arkansas, and South Texas was 1.67 (CRF = 1) and 13.68 (CRF = 8) for the remaining CMU States. The probability of being recovered in Mexico was eight times greater for an adult dove banded in Montana, North Dakota, Minnesota, South Dakota, Wyoming, Nebraska, Iowa, Kansas, Colorado, New Mexico, Oklahoma, and North Texas than an adult banded in Missouri, Arkansas, and South Texas (Fig. 20).

Tendency for immature doves to migrate to Mexico. – Tests for independence of immature doves being recovered in Mexico indicated an alignment of CMU banding States similar to that for adults. The only exception was that for immatures, Iowa fell into the group with Missouri, Arkansas, and South Texas. The combined recovery rate index for these States was 10.06 (CRF = 1); for the remaining CMU States, it was 32.96 (CRF = 3). Therefore, an immature dove banded in Iowa, Missouri, Arkansas, and South Texas was one-third as likely to be recovered in Mexico as an immature dove banded in the remaining CMU States (Fig. 21).

Age and Sex Differences

The migrational corridors of adult vs. immature and male vs. female doves from their respective States of banding appear to be similar in that all doves, regardless of age or sex, follow the same routes from specific areas of origin (Tables A-14 to A-23). However, differences among age and sex cohorts in proportions of recoveries obtained from specific harvest areas appear to vary along these corridors. This fact suggests either that migrational timing is different or that the relative proportions of migratory to non-migratory segments are different among age and sex classes.

Distributional differences within age and sex cohorts were examined by comparing the numbers of direct recoveries inside State of banding with those outside State of banding (adults vs. immatures and adult males vs. adult females). Data from each hunting State (all years pooled) were subjected to the Z-test, $Z = P_1 - P_2 / \sqrt{PQ(1/n_1 + 1/n_2)}$ (Snedecor and Cochran 1967:221). The composite test statistic was derived by summing the Z-values and dividing by the square root of the number of States used. The null hypothesis was that the proportion of direct recoveries of adult doves occurring inside State of banding was the same as that of immature doves. A similar hypothesis was tested for adult males vs. adult females.

Adults vs. immatures. – The percentage of direct recoveries occurring in State of banding was higher for adults than immatures in seven of the eight areas examined

(Missouri, 83.4 vs. 68.7%; Kansas, 73.7 vs. 49.6%; Colorado, 62.9 vs. 40%; New Mexico, 78.6 vs. 56.8%; Oklahoma, 66.7 vs. 54.3%; North Texas, 90.4 vs. 78.6%; and South Texas, 95.5 vs. 78.4%, Table A-37). The area with a lower in-State percentage for adults than for immatures was Arkansas (85.4 vs. 86.2%). The composite test indicated that band recoveries of adults occurred in State of banding in higher proportions ($P < 0.01$) than those of immatures. These data suggest that immatures either begin their migration before adults or that they are more likely to migrate than adults.

Adult males vs. adult females. – The percentage of direct recoveries occurring in State of banding was higher for males than for females in five of eight hunting areas examined (Missouri, 90.4 vs. 72.3%; Colorado, 64.4 vs. 60.7%; New Mexico, 84.3 vs. 61.1%; Oklahoma, 76.7 vs. 45.5%; and North Texas, 91.3 vs. 86.7%, Table A-38). Areas with lower percentages of in-State recovery for males than for females were Kansas, 71.5 vs. 77.5%; Arkansas, 85.0 vs. 85.4%; and South Texas, 95.0 vs. 97.1%. The composite test indicated that band recoveries of males occurred in State of banding in higher proportions ($P < 0.01$) than did those for females. These data suggest that females either migrate earlier than males or that they are more apt to migrate than males.

Summary

Migrational patterns of mourning doves from CMU States of origin differ from region to region. The data suggest that the migrational pattern of doves is generally southward and shaped somewhat like an inverted fan. Doves which originated from more northern latitudes exhibited greater probabilities of being recovered in both the EMU and WMU than doves originating in the southern latitudes.

A dove banded in South Texas, Arkansas, Missouri, and Iowa was less likely to be recovered in Mexico and more likely to be recovered in the EMU than a dove banded in the remaining CMU States. This portion of the CMU is the general area described as containing an intermediate form of *Z. m. carolinensis* and *Z. m. marginella* (Aldrich and Duvall 1958).

When distributional patterns of age and sex cohorts are compared, it is clear that the geographical patterns are similar. However, immatures are recovered out of the State of origin in greater proportions than adults. Similarly, adult females are also recovered out of State in greater proportion than adult males. This fact indicates that immatures either migrate earlier than adults (and adult females earlier than adult males) or that they are more prone to migrate from State of banding.

Distribution of the Harvest

Band recoveries can be used to illustrate not only dispersal patterns of doves from specific points of origin, but also distribution of the harvest within a specific harvest area or areas. However, the recovery information must be weighted to adjust the raw data for differences in banding efforts among the origination areas, as well as for the varying sizes of the areas and density of breeding doves within them. Each recovery is thus placed in perspective to the number of birds it represents. Comparison of weighted recoveries for several harvest areas allows computation of the relative importance of each.

The weighting factors for each breeding area were derived by multiplying the land area value by the average mourning dove breeding density (as measured by call-count surveys) during 1967–75 (1967–74 for CMU States) and dividing the product by the number of doves banded during the same period (Kiel 1959; Dunks 1977, Table A-39). Breeding densities and land area values for each State were obtained from the 1976 Mourning Dove Status Report (Dolton 1977). The land area values for North and South Texas were taken from Dunks (1977).

There are possible biases in using weighted data. The relative distribution of mourning dove harvest will be estimated incorrectly if there are differences in reporting rates of recovered bands among harvest areas. Likewise, if certain States or countries do not maintain a uniform hunting opportunity during the period of study, the respective share of the harvest can be misinterpreted as an annual proportion rather than the average harvest for the duration of the period under consideration. Although reporting rates undoubtedly vary among States (Reeves 1979), differences are not thought to be great. Reporting rates from areas and countries in Latin America are probably also relatively constant. It is suspected, however, that U.S. reporting rates may be different from those from Mexico and Central America (Blankenship and Reeves 1970). Consequently, we have chosen not to compare the relative magnitude of mourning dove harvests between the United States and Latin America.

Distribution and Density of Harvest in the Central Management Unit (All Doves)

We calculated distribution and relative densities of the mourning dove harvest in the CMU (Table A-40) using direct recoveries (Table A-45) and land area weights (Table A-39).

Distribution. – Of the total harvest in the CMU, North Texas accounted for the highest proportion (27%), followed by South Texas (17%), Missouri (13%), Kansas (11%), Oklahoma (10%), and South Dakota and Arkansas (8% each). Nebraska had closed seasons during 1967–74 and therefore is not represented. However, Nebraska has now permitted dove hunting for 7 years (1975–81) and no doubt presently accounts for a proportion of the harvest equal to or greater than that for Kansas.

Density. – When density of the harvest is examined, the perception of relative importance of the harvest areas

changes. Although Texas still ranks as an important harvest area, other States also rank high in numbers of doves harvested per land area unit. South Texas had the highest harvest density (123 birds per unit) followed by Missouri (89), Oklahoma (74), Arkansas (71), Kansas (68), North Texas (66), and South Dakota (54). The West–CMU States of Colorado and New Mexico had much lower harvest densities, each with about 12. As one entity, Texas (80) ranked below Missouri and slightly higher than Oklahoma and Arkansas.

Composite evaluation. – Harvest pressure on mourning doves in the CMU is greatest in the southern portions of the Mid– and East–CMU tiers and lightest in the West–CMU. South Texas and Missouri had the highest harvests per land area unit.

Distribution of Harvest in the Southern Zone (All Doves)

The following discussion of harvest distribution in Mexico and Central America is based on data contained in Tables A-41 and A-42, unless otherwise indicated. Contribution and harvest reference areas are depicted in Table A-5 and Fig. 13.

Of all doves banded in the United States and subsequently recovered in the Southern Zone, 89% occurred in Mexico and 11% in Central America. The Western Highlands of Mexico was the predominant recovery location with 70% (Table A-41). The importance of this harvest region is confirmed by the fact that its harvest ranged between 60 and 81% of the total from each of the management unit tiers (Table A-42). Other important harvest regions were Mexico's Northwest Coast (9%), Central Highlands (5%), and Guatemala (5%).

Mexico's Northwest Coast was an important harvest region for the three western tiers (West–WMU 22%, East–WMU 22%, and West–CMU 12%), but few birds from these tiers were recovered south of the Central Highlands (less than 4%). In contrast, the combined Southern Regions 5–12 were important as harvest areas for birds banded in the three eastern tiers (Mid–CMU 26%, East–CMU 34%, and EMU 25%). No doves were recovered in the Yucatan Peninsula (Tables A-41 and A-42).

Mexico (n = 882)

Within its 1,968,400 km^2, Mexico has a varied combination of habitats, ranging from deserts to jungles. The country is the annual recipient of many migratory species, including the mourning dove.

Nine hundred two direct recoveries of doves banded in the United States were reported from Mexico. Of these, 20 were taken in unknown localities and were omitted from this part of the analysis. Mexico accounted for 89% of the total Southern Zone mourning dove harvest (Table A-41). However, the harvest distribution in Mexico was not uniform. Seventy-three percent of the harvest occurred in the three-State area of Jalisco, Guanajuato, and Michoacan, where a large proportion of Mexico's grain is grown and where 16% of the human population occurs (Weil et al. 1975). The Northwest Coast area of Baja California, Sonora, Sinaloa, and Nayarit was the location of about 10% of the total Mexican harvest. The rest of the harvest was distributed among the remaining Mexican States, with the important exception of the Yucatan Peninsula where no recoveries were recorded.

Region 1 – Northwest Coast (n = 87). – Although much of this region consists of desert and mountainous country, irrigated farming of grain crops has increased greatly along the coastal plain within the past 15–20 years. Mourning doves in large numbers are attracted to these feeding sites and American hunters from Arizona and California have increasingly visited the area to hunt doves during the past few years. Ten percent of Mexico's harvest occurred in this region, particularly in the State of Sinaloa. The harvest pattern in this State followed Federal Highway 15 and is greatest in two areas, south of Los Mochis in the Mocorito–Guamuchil area and south of Culiacan in the El Espinal–LaCruz–Elota area.

Region 2 – Northern Highlands (n = 21). – This region is composed of extensive mountain ranges and desert and contains only 8% of Mexico's human population (Weil et al. 1975). Only 2% of the total dove harvest occurred here even though the geographical area makes up 23% of the total Mexican territory. Most of the recoveries were from the State of Zacatecas. The more northern and larger States of Chihuahua and Durango were inconsequential dove harvest locations.

Region 3 – Northeast Coast (n = 11). – About 1% of Mexico's harvest occurred in this huge area (18% of Mexico's total land area – Weil et al. 1975) bordering the United States. During the past 15 years, irrigated farming for sorghum and corn has increased greatly in this area, particularly in Tamaulipas. Because a large white-winged dove harvest occurs here, we know that heavy hunting pressure is exerted in August, September, and October. The absence of a substantial mourning dove harvest is a puzzle. Possible explanations are that migrating mourning doves have not yet reached Mexico, that they use other routes into Mexico, or that they overfly the area.

Region 4 – Western Highlands (n = 694). – This region includes the lake and agricultural areas between Mexico City and Guadalajara. It constitutes 12% of the total land area and contains 20% of the human population, not including nearby Mexico City, which has 14% of the population (Weil et al. 1975). The area attracts large concentrations of doves and a moderate number of hunters. As a result, 78% of the Mexican and 70% of the Southern Zone harvest occurred in this region. Distribution of the dove harvest in the State of Jalisco was concentrated around Guadalajara and northeastward along Highway 80 through Tepatitlan and Jalostotitlan to Encarnacion de Diaz. In Guanajuato, the harvest was distributed in the southwest-

ern part of the State south of Leon. In Michoacan, much of the harvest occurred along the northern and western border abutting Jalisco but harvest was also distributed across the middle of the State from Tepalcatepec through Apatzingan and Tacambaro to Zitacuaro.

Region 5 – Central Highlands (n = 49). – This region contains 5% of the total land area and 33% of the human population (Weil et al. 1975). In spite of the mountainous terrain and many urban centers, 6% of the Mexican harvest was obtained here. Although the harvest within the region was fairly evenly distributed, most recovery locations were in the three southern States bordering Guerrero.

Region 6 – Southern Mexico (n = 20). – This region contains 12% of the total land area and 16% of the human population of Mexico (Weil et al. 1975). Even though this region undoubtedly acts as a funnel (particularly the Isthmus of Tehuantepec) for migrating doves into Central America, only about 2% of Mexico's harvest occurred here. This phenomenon can partly be explained by the fact that a large portion of the human population consists of primitive Indians that cannot afford arms and ammunition. In addition, large areas either are overflown or do not receive migrating doves, particularly in the northeastern portions of the region.

Region 7 – Yucatan Peninsula (n = 0). – This region makes up 8.5% of the land area and 4% of the human population (Weil et al. 1975). Mourning doves apparently do not migrate through this region as no recoveries were obtained there. Migratory routes for mourning doves obviously follow the Pacific coastline once the birds reach southern Mexico. This statement is supported by the location of recoveries in Central America.

Central America (n = 102)

Central America has an area of about 540,000 km^2 and a population of over 19 million people (Anon. 1977). The northeastern sections of the isthmus bordering the Caribbean Sea are tropical and contain large expanses of jungle. The southwestern Pacific Coast areas are hot and relatively dry; clearing of native vegetation has created an extensive system of farming for corn, sorghum, rice, and cotton. There are no breeding populations of mourning doves in Central America, but many birds from the United States annually migrate as far south as Costa Rica. Migrating doves are generally found in the agricultural belt, but are also encountered in the higher intermontane regions between the two coasts.

Until recently, sport hunting in Central America was relatively light although some subsistence harvest with traps, .22 caliber rifles, and slingshots has occurred for many years. Because arms and ammunition are expensive, hunting of migratory birds is now conducted almost exclusively by foreign hunters, particularly Americans (H. Nanne, V. Ortega, and P. Purdy, personal communication). Only in the last 5 years have the countries actively solicited affluent hunters as a form of tourism. Hunting harvest is still relatively low despite increasingly large numbers of hunters visiting Central America.

Of the total Southern Zone harvest of mourning doves originating from the United States, 11% occurred in Central America from Guatemala south to northern Costa Rica (Table A-41). Nearly half (46%) of Central America's mourning dove harvest occurred in Guatemala; 28% occurred in El Salvador. Another 23% of the kill was taken in Honduras and Nicaragua. Costa Rica was a minor harvest area for doves originating from the United States, and no birds were recovered in Panama. Costa Rica appears to be the southern terminus for mourning doves migrating from the United States.

Region 8 – Guatemala (n = 45). – This country has an area of 108,880 km^2 and a population of over 6 million people (Anon. 1977). The economy is agrarian, and a large proportion of the population is of Maya Indian origin (Dombrowski et al. 1970). About half (46%) of the Central American and 5% of the Southern Zone harvest of U.S. doves was taken in this country. Distribution of harvest within Guatemala followed two routes. The first was in a central valley north of the volcanic extension of Mexico's Sierra Madre del Sur from Huehuetenango through Jalapa, Mojas, and Asuncion Mita. The second was south of the Sierra Madre near Tiquisate, La Democracia, and Masaqua. Both areas are agricultural; the southern area supports cotton, sorghum, and corn and the northeastern area supports sorghum, rice, and sugarcane (V. Martinez, personal communication).

Region 9 – El Salvador (n = 30). – The smallest Central American country has an area of 21,400 km^2 (Blutstein et al. 1971*a*), but it contains the highest human population density, 4.2 million inhabitants (Anon. 1977). As in Guatemala, migrating doves follow the southern coast and central intermontane corridor where they have been harvested mainly by American hunters (current regulations effectively bar hunting by foreigners – F. Serrano, personal communication). Some central corridor harvest locations were Candelaria, Nueva Concepcion, Chalatenango, and Santa Rosa. Southern harvest locations were La Libertad and La Union. Hunters in El Salvador took 28% of Central America's harvest and 3% of the Southern Zone harvest.

Region 10 – Honduras (n = 12). – Honduras is a large and rugged country with an area of 112,150 km^2 (Blutstein et al. 1971*b*) and nearly 2.9 million human inhabitants (Anon. 1977). Most dove harvest occurs in the southern tip of the country surrounding the city of Choluteca. Agricultural crops providing dove foods are corn, sorghum, rice, and sesame. Foreign hunters have increased greatly in the last few years; in the 1976–77 season, 459 hunters took almost 32,000 mourning doves, whereas in 1977–78, 926 hunters harvested 51,200 mourning doves (P. C. Purdy, unpublished report). During the study period, hunters in Honduras took 9% of the total Central American harvest and 1% of that in the Southern Zone.

Region 11 – Nicaragua (n = 13). – This is the largest Central American country with an area of 147,900 km² and about 2.3 million people (Anon. 1977). Although mountainous in the interior, it is not as rugged as Honduras (Ryan et al. 1970). Most of the dove harvest occurs around the perimeters of the two huge lakes in the southwestern part of the country (Managua and Nicaragua). Estrada O. (1978) estimated that 600 hunters killed over 68,000 mourning doves in 1976–77 and that 512 hunters killed about 142,000 mourning doves in 1977–78. As in Honduras, hunting by American and other foreign hunters is increasing, whereas few natives hunt doves. Nicaragua accounted for about 14% of the Central American harvest and 1.5% of the total Southern Zone harvest of birds banded in the United States.

Region 12 – Costa Rica (n = 2). – This country, less than half the size of its two northern neighbors, has an area of 51,000 km² (Blutstein et al. 1970). Its human population numbers about 2 million and consists mainly of European-origin peoples (Anon. 1977). Costa Rica is also mountainous, but most of the human population lives in temperate highland valleys, particularly the Meseta Central. The Pacific Coast is narrow and not particularly suited for agriculture. As a result, doves banded in the United States apparently go no farther than the northwest province of Guanacaste near Canas and Esparta. This area appears to be the southward terminus for migrating doves from the United States and accounts for only 3% of Central America's and less than 0.5% of the Southern Zone harvest.

Derivation of the Harvest

Derivation of the harvest is the determination of breeding or natal areas for doves taken in specific harvest areas. As with distribution of the harvest, weighting factors (Table A-39) must be used to estimate derivation of harvest. The relative contribution that all breeding areas make to the harvest of specific areas can thus be computed because each recovery is placed in perspective to the number of birds it represents.

Summaries of direct and indirect recoveries in the CMU by State of banding are presented in Tables A-43 to A-48 and those in the Southern Zone are shown in Tables A-49 to A-54. Only direct recoveries were used to determine derivation of the harvest to eliminate information from banded birds that did not return to the original breeding or natal area. Thus, a bird banded in North Dakota, that wintered in Mexico, and subsequently migrated to California where it was harvested the following fall, would not be included. Except for a few odd records like this example, State and Southern Zone derivations of the harvest based on all recoveries were similar to those based only on direct recoveries.

Derivation of the harvest was determined by age class for each CMU hunting State (Tables A-55 to A-57) and for each region of the Southern Zone (Tables A-58 to A-60). The following discussion of derivation is based on direct recoveries of all doves, the data for which are summarized in Tables A-45 and A-57 (CMU) and A-51 and A-60 (Southern Zone).

Derivation of the Harvest – Central Management Unit (All Doves)

Generally, hunters in CMU hunting States harvested birds that nested in or were hatched within those States, with less than 10% originating from other States (Table A-57). Four harvest areas differed from this pattern (Colorado, New Mexico, North Texas, and South Texas), each deriving 40% or more of their harvest from other States. Except for Colorado, these areas had southern locations. About 98% of the harvest in the CMU came from CMU States and 2% from other units, predominantly from the EMU (1.8%). Individual areas that received more than 1% of their harvest from the EMU were on the eastern border of the CMU: Missouri, Arkansas, North Texas, and South Texas. Most of the harvest in Texas from out of State originated in the Mid–CMU tier of States, although Missouri, Iowa, and Minnesota also contributed to some degree. In Colorado and New Mexico, the harvest from outside the States came mainly from the West–CMU, although Mid–CMU States also contributed to the kill there (between 10 and 20%).

South Dakota (n = 573). – The harvest in South Dakota consisted almost entirely of birds originating from the State (about 98%) and North Dakota (2%). Less than 1% of the harvest came from Minnesota, Wisconsin, and Colorado. No doubt some birds from southern Canada also were harvested in South Dakota, but we could not measure this input because of the lack of banding in Canada.

Wyoming (n = 4). – Although few birds were recovered in Wyoming, all originated from that State. It is noteworthy that none of the 13,000+ birds banded in Montana were harvested in Wyoming.

Missouri (n = 522). – Although most of Missouri's harvest consisted of birds originating from within that State (94%), 4% came from EMU States, particularly Kentucky, Illinois, and Wisconsin. Other CMU States contributed slightly less than 2% to Missouri's harvest.

Kansas (n = 283). – In Kansas, hunters also harvested mostly birds banded there (94%). CMU States contributing doves to the kill in Kansas were Missouri (>2%), the Dakotas (<2%), and Nebraska and Iowa (about 1%). A peculiarity was that the southern areas of Arkansas, Oklahoma, and South Texas provided about 1% of the Kansas harvest.

Colorado (n = 189). – Sixty-three percent of the harvest in Colorado originated from within the State. Fully 25% came from birds banded in Montana and Wyoming, immediately north of Colorado. Mid–CMU States contributed nearly 11% of the Colorado kill, whereas the WMU accounted for only 1%. It has been suggested that the Rocky

Mountains act as a barrier and perhaps a north–south guide during migration (Braun 1979).

New Mexico (n = 199). – In New Mexico, only 58% of the harvest originated from within the State. The other, more northern States of the West–CMU provided 21% of the New Mexico harvest, and Mid–CMU States contributed nearly as much with 18%. The WMU contributed more to the harvest in New Mexico than to any other State in the CMU but was less than 3%.

Oklahoma (n = 227). – Ninety percent of Oklahoma's dove harvest consisted of birds originating within the State. The Mid–CMU States contributed 5%, and the East–CMU States provided 4%. The WMU, West–CMU, and EMU combined contributed less than 1% of the harvest.

Arkansas (n = 415). – Ninety-four percent of the Arkansas harvest originated from within the State, 4% came from adjacent EMU States, and 2% came from the East–CMU. No birds originating from areas west of the East–CMU tier were harvested in Arkansas.

North Texas (n = 1,198). – About 59% of the harvest in North Texas originated from within North Texas. Nearly 30% of the harvest came from other Mid–CMU States; only 3% came from west of the Mid–CMU and 7% from east of this tier. Oklahoma and Kansas were the main out-of-State contributors to the North Texas harvest with about 13 and 6%, respectively.

South Texas (n = 780). – Less than half (49%) of the South Texas harvest originated from within South Texas. Other Mid–CMU States contributed 35% of the harvest; the East–CMU contributed 12% and the EMU 4%. Only 1% of the South Texas harvest was contributed by States west of the Mid–CMU. In contrast to the North Texas kill, a greater proportion of the harvested birds in South Texas originated from northern and eastern States. This probably reflects the later hunting season dates in South Texas, which allowed time for birds from the north to migrate into the harvest area.

Derivation of the Harvest – Southern Zone (All Doves)

The derivation data for all doves harvested in Mexico and Central America are summarized in Tables A-51, A-57, and A-60 and are discussed in detail below.

Mexico (n = 902)

Of the 902 direct recoveries in Mexico from doves banded in the United States (Table A-51), 75% originated in CMU States, 23% in WMU States, and less than 2% in the EMU (Tables A-57 and A-60). The greatest contributors to the harvest in Mexico were the Mid–CMU States (52%); Oklahoma (13%), Nebraska (10%), and Kansas (9%) were the most important. The West–CMU tier contributed 16% of the kill, with each of the four States (Montana, Wyoming, Colorado, and New Mexico) in that tier providing between 2 and 6%. Of the WMU contribution, Arizona (7%) and California (5%) were major suppliers to the Mexican harvest.

Region 1 – Northwest Coast (n = 87). – As would be expected, the northwestern part of Mexico received a large proportion of its dove harvest from the WMU (50%) and few birds from the EMU and East–CMU (3%, Table A-60). Somewhat surprisingly, however, 47% of its harvested doves originated from the Mid–CMU and West–CMU tiers of States; these birds had to cross the Sierra Madre Occidental to reach the harvest locations. This mountain barrier must not impose as large a problem to mobility as suspected.

Region 2 – Northern Highlands (n = 21). – Although hunters in this region harvested a small number of doves from the United States, remarkably even proportions of birds were received from all five of the WMU and CMU tiers of States. The largest contributor was the East–WMU with 30%, but the West–CMU provided 21% and Mid–CMU 22%. The EMU contributed no birds to the harvest in this region.

Region 3 – Northeast Coast (n = 11). – Migrating doves from the United States apparently overfly or otherwise bypass northeastern Mexico. However, of the few birds that were recovered in this region, 64% came from the Mid–CMU tier of States, 18% from the East–CMU, and 5% from the EMU. That area of the United States west of the Mid–CMU contributed less than 14% of the Northeast Coast harvest.

Region 4 – Western Highlands (n = 694). – More than 75% of the harvest in Mexico occurred in this region, particularly in the States of Jalisco and Michoacan. The major contributor to this harvest was the Mid–CMU with 53%. The West–CMU provided 17% and the West–WMU 13%. The East–WMU and East–CMU each contributed about 8% and the EMU 1%.

Region 5 – Central Highlands (n = 49). – About 6% of the harvest in Mexico was taken in this region, mainly in the States of Morelos, Puebla, and Mexico. Fully 77% of this harvest originated from the Mid–CMU tier of States located directly north of the region. Thirteen percent of their harvest came from the East–CMU (10%) and the EMU (3%), whereas 10% originated in the other three tiers west of the Mid–CMU.

Region 6 – Southern Mexico (n = 20). – Although this region accounted for only about 2% of the Mexican harvest of doves banded in the United States, many birds probably fly through or over the Isthmus of Tehuantepec. Of the birds harvested in this southern region, all originated from areas of the United States east of the West–CMU. The Mid–CMU contributed 70%, the East–CMU supplied 25%, and the EMU 5%.

Region 7 – Yucatan Peninsula (n = 0). – Migrating mourning doves from the United States apparently bypass this region entirely on their southern migration, preferring a more southwesterly route.

Central America (n = 102)

Eleven percent of the Southern Zone harvest occurred in Central America (Table A-41). As in Mexico, the Mid-CMU States played an important part in providing birds to the Central American dove harvest (Tables A-51, A-57, and A-60). Ninety-six percent of the Central American kill originated in the CMU; North Dakota (14%), South Dakota (8%), Nebraska (11%), Kansas (24%), Oklahoma (9%), North Texas (8%), and South Texas (2%) were the major contributors. The WMU provided less than 4% of the harvest and the EMU less than 1%.

Region 8 – Guatemala (n = 45). – With nearly half (46%) of the Central American and 5% of the Southern Zone harvest (Table A-41), Guatemala received 93% of its kill from the CMU (Mid-CMU, 65%; East-CMU, 24%; and West-CMU, 5%) (Table A-60). Less than 7% of the kill was provided by the WMU (6%) and EMU (<1%) combined.

Region 9 – El Salvador (n = 30). – Nearly all doves coming from the United States and harvested in El Salvador originated in the CMU (98%), with the rest coming from the EMU. The Mid-CMU States contributed 82% of the Salvadoran harvest; 15% came from the East-CMU. Only 2% of the harvest originated from west of the Mid-CMU tier of States.

Region 10 – Honduras (n = 12). – With only 9% of the Central American harvest, Honduras received 94% of its kill from the CMU, most of which (79%) came from the Mid-CMU.

Region 11 – Nicaragua (n = 13). – Nicaragua accounted for about 14% of the harvest of doves in Central America. Over 99% of the harvest was provided by the CMU; 92% came from the Mid-CMU tier. None of the harvest originated from west of the Mid-CMU tier and less than 1% came from the EMU.

Region 12 – Costa Rica (n = 2). – The two direct recoveries in Costa Rica came from the Mid-CMU (South Dakota and Oklahoma).

Sex and Age Differences in Derivation of Harvest

Central Management Unit – males vs. females. – Derivation data for adults were examined separately by sex to determine if differences exist. The small sample sizes in each State, particularly for females, made derivation comparisons rather imprecise. In addition, because of weighting procedures, statistical testing for differences was impractical. However, close examination of the data indicates that contributions by adult males and females to State harvest were remarkably similar. For both males and females, about 98% of the CMU harvest came from within the unit and 1–2% from the EMU. Although this varied from State to State, general origins of the harvest within each State by sex were alike.

A small but discernible difference between sex cohorts was noted in the proportion of recoveries that originated in the State of recovery. In eight of the nine CMU hunting States, higher proportions of male recoveries originated in-State than did those of females (Table A-61). Although most differences were slight, in New Mexico males had a 79% in-State recovery compared with 60% for females; in North Texas these figures were 69 and 52% for males and females, respectively. The difference in New Mexico is probably due to the small female sample size (20 total recoveries). In North Texas, the large difference can be accounted for by the high weighting factor for Oklahoma and thus the disproportionately high calculated contribution of female doves from Oklahoma to the North Texas harvest. Nevertheless, these data indicate that with the onset of fall migration, males tend to linger in the nesting area longer than females.

The only exception to this trend was in South Texas where 43% of the males and 50% of the females were in-State recoveries. Because the dove hunting season in South Texas is later than in the other States, early migration of one sex probably would be masked by the later sampling dates.

Irrespective of the evidence that adult females began migration slightly earlier than adult males, the similarities of the sexes in contribution to the harvest among States dictated that all data for adults be combined for further analysis.

Southern Zone – males vs. females. – Exact locations of recovery in the Southern Zone were known for only 161 males and 91 females. Accurate calculation of contribution differences between sexes within specific areas was impossible because of the small samples. Within the Southern Zone, 80% of the adult male recoveries originated from the CMU, 18% from the WMU, and 3% from the EMU. For females, 85% came from the CMU, 11% from the WMU, and 3% from the EMU. Thus, adult male and female data were combined for the Southern Zone for further comparisons.

Central Management Unit – adults vs. immatures. – Within each CMU State, derivation of the harvest for immatures and adults followed the same general pattern (Tables A-55 and A-56). However, except for South Texas, the proportion of immature doves taken within State of banding vs. out of State was substantially lower than that of adult males and generally lower than that of adult females (Table A-61). This fact indicates that many immatures had moved to other areas by the time the hunting season opened in early September. Thus, it appears that immature mourning doves are the first population segment to initiate southward migration, followed by females and then males.

Southern Zone – adults vs. immatures. – The derivation of the harvest within Mexico is similar for immatures and adults (Tables A-58 and A-59); about 54% of the harvest originated from the Mid-CMU and 16% from the West-CMU, about 20% from the WMU, and 2% or less from the EMU. For Central America, both age classes had

slightly over 90% of the harvest contributed from the Mid–CMU and East–CMU and less than 2% from the West–CMU. The combined EMU and WMU contribution was no more than 5% of the Central American harvest. For the entire Southern Zone, the proportional contributions of each age cohort from the six U.S. tiers were nearly identical; the CMU contributed about 80% of the harvest.

Chronology of Migration

Previous studies designed to measure the chronological migration patterns of mourning doves have relied primarily on general observations and roadside counts to detect the rise and fall of dove numbers during August, September, and October (Ginn 1950; Truett 1966; Miles 1976; H. Funk, unpublished report). These studies documented increases in dove numbers during early August and declines during late August or early September, thus indicating that doves exhibit some migratory behavior in August. Studies based on these or similar procedures are limited because they fail to compensate for simultaneous immigration and emigration of doves.

Another approach in describing dove movements involves the use of band recoveries to examine the arrival dates of doves in southern areas. Changes in the origin of doves harvested in a southern area as the season progresses reflect the relative migrational patterns of doves into an area (Dunks 1977). This procedure also has limitations because of simultaneous ingress and egress of doves, but it allows quantification of the relative numbers of birds entering a harvest area from each contributing area.

Chronological Changes in Origin of Doves Harvested in Texas

Texas is an area of heavy dove harvest that receives birds from every State in the CMU and several States outside the CMU. It was the only area in the CMU having sufficient numbers of recoveries over a wide span of time for which chronological derivations could be examined.

The origin of doves harvested in North Texas was calculated for each 10-day period in September and for the entire month of October (Tables A-62 to A-64). Similar calculations were made for South Texas on a monthly basis (Tables A-65 to A-67). These data were stratified by age of bird banded and weighted as explained earlier. Derivation estimates based on direct, indirect, and total recoveries were examined and differences among them were evaluated as being small. However, only direct recoveries were used because fewer assumptions had to be met (relocation, differential survival, etc.).

North Texas – All Doves

1–10 September. – During this period, 72% of the harvested doves originated from within North Texas (Table A-62). Oklahoma and Kansas contributed 16 and 3%, respectively. South Texas contributed 3%. All other areas providing birds each contributed less than 1%.

11–20 September. – During this period, 57% of the harvested doves originated from within North Texas, whereas 9% came from Oklahoma and 13% from Kansas. Other States to the north began contributing, generally from 1 to 5% each.

21–30 September. – During late September, the percentage of birds originating in North Texas was 35%. Oklahoma contributed 15% and the States to the north began contributing a greater proportion than the previous periods (about 9% each for Kansas, Nebraska, South Dakota, and North Dakota).

1–31 October. – During October, 27% of the harvested doves originated from within North Texas. Oklahoma, Kansas, Nebraska, South Dakota, North Dakota, and Iowa each contributed 9 to 10%. Minnesota and Missouri contributed 5 and 2%, respectively; 3% came from the EMU.

North Texas – Immatures and Adults

The origins of immatures and adults (Tables A-63 and A-64) harvested in North Texas were similar in that there was a general decrease in the proportion of doves that originated from within North Texas as the hunting season progressed. The percentages of doves originating from within North Texas were 68, 57, 30, and 24 for immatures and 81, 59, 37, and 32 for adults during the four periods, respectively. Doves originating from northern States increased as the season progressed. The EMU provided relatively few doves to North Texas during earlier periods ($\leq$0.6% during 1–10 September), but contributed 3% of the harvest during October. One noticeable difference between immature and adult doves is that immature doves had a greater tendency to move northward than adults. The contribution of immatures from South Texas to the harvest in North Texas ranged from 3 to 8% during the various time periods, whereas adults ranged from 0 to 2%.

South Texas – All Doves

The chronological derivations for all ages combined, immature, and adult doves harvested in South Texas were also calculated (Tables A-65 to A-67). However, two factors decreased the effectiveness of the analysis for South Texas. This area received fewer direct band recoveries than North Texas. Also, recoveries were not distributed throughout September and October because of later hunting season opening dates (Table A-3). Nevertheless, there was a sizable increase during October in the percentage of doves harvested there that were derived from States to the north and northeast. Of the total doves harvested in South Texas during September, 70% originated from within South Texas. During October, 32% originated from within South Texas and 13% originated from Kansas. North Texas, Oklahoma, Missouri, Nebraska, South Dakota, Iowa, and Min-

nesota contributed 5 to 8% each (Table A-65). The EMU contributed 4%.

Age Differences in Arrival Patterns in Texas

Earlier in the analysis, it was determined that a higher proportion of the direct recoveries of immature doves occurred outside the State of banding than that for adults ($P < 0.01$). Thus, it was deduced that immatures departed their natal area before adults. Another way to examine the movements of adult and immature doves is to determine whether immatures from a given area arrive at a point in their southward migration earlier than adults.

North Texas was used as the recovery area. The number of direct band recoveries by 10-day intervals during September and October from doves banded outside Texas was sufficient to test the hypothesis that adult and immature doves have similar chronological recovery patterns in North Texas. A series of log likelihood ratio tests of independence (Sokal and Rohlf 1969) was used to test the hypothesis (Table A-68).

Direct band recoveries from most States were insufficient for testing on an individual State basis. Of the States tested, no differences were detected except for Kansas (Table A-68, Test No. 1).

Direct recoveries of banded adults from all States outside Texas were pooled and compared with the pooled data for immatures. The test of independence (Test No. 2) indicated that the chronological recovery pattern of adults was different ($P < 0.01$) from that of immatures. To determine which periods were accounting for most of the variation, we removed the 1–10 September period and tested the remaining five periods for independence (Test No. 3). No difference was detected. These five periods were pooled and tested against the first 10-day period (Test No. 4). A difference ($P < 0.01$) was detected. The 1–10 September period accounted for about 77% of the total chi-square value or 77% of the aberration.

The States were then combined into two groups. Montana, North Dakota, Minnesota, Wisconsin, Illinois, Iowa, South Dakota, Nebraska, and Wyoming were classified as northern States. New Mexico, Colorado, Oklahoma, Kansas, Missouri, Arkansas, and Louisiana were classified as southern States. Data were combined within each group and the hypothesis tested that immature and adult mourning doves have similar chronological recovery patterns in North Texas.

No difference was detected between recovery patterns for adult and immature doves from northern States (Test No. 5). No difference was detected between recovery patterns for adult and immature doves from southern States (Test No. 6). However, to be consistent with earlier testing, the first 10-day period was removed and the remaining five periods were tested for independence (Test No. 7). No difference was detected so the five periods were combined and tested against the 1–10 September period (Test No. 8). Results indicated a rejection of the null hypothesis ($P < 0.01$); therefore, the 1–10 September period accounted for most of the variation (about 82%). This indicates that immatures arrived earlier than adults, were more vulnerable to the gun than adults early in the season, or a combination of both.

If immature doves were considerably more vulnerable than adults during early September, and the vulnerability difference between the two decreased as the season progressed, a recovery pattern similar to that observed could be expected. This potential explanation was tested indirectly by comparing the chronological recovery pattern in North Texas of adults banded in North Texas with immatures banded in North Texas (Test No. 9). These data failed to indicate a vulnerability bias; therefore, we conclude that the change in proportions was the result of early arriving immatures.

Similar procedures were followed for recoveries in South Texas; however, no chronological differences were detected. Inconsistent season dates in South Texas were not conducive to such testing.

Chronology of Recoveries in Mexico

The chronology of direct recoveries in Mexico was examined for doves banded in the CMU during 1967–74. Chronological recovery patterns were used to depict the timing of hunting pressure and to approximate arrival dates.

In Mexico, the dates of the mourning dove hunting seasons varied considerably during the span of this study (Table A-4). Seasons opened as early as 1 August, and as late as 1 November. Seasons encompassed October in 5 of 8 years and November in 6 of 8 years. However, it is recognized that hunting in Mexico was not necessarily confined to the official season. This factor was the reason why we included all Mexican recoveries from August through May in this report. We believe that the chronological pattern of recoveries in Mexico was not strongly influenced by the hunting season dates prescribed by the law and, therefore, that the recovery dates represented the arrival pattern of CMU doves. However, it is recognized that if hunting seasons uniformly had opened earlier, a larger proportion of the recoveries might have occurred during September.

Ten-day periods in which direct recoveries were reported from Mexico were tabulated for adult and immature doves (Table A-69). Of the 184 direct recoveries of adults and 511 of immatures, 162 (88%) and 457 (89%) were identifiable to the 10-day period of recovery.

The recovery patterns indicate that both adult and immature doves from the CMU began arriving in southern harvest areas of Mexico during late September and early October; there was a marked increase during 11–20 October. Recoveries during this period were 3 times that of 1–10 October, and were the highest of all 10-day periods (21 and 67 recoveries for adults and immatures, respectively). Recoveries for adults remained high through 1–10 November; they averaged about 16 recoveries per 10-day period, decreasing to about 6 recoveries per 10-day period

through 11–20 April. Recoveries of immatures remained high from 11–20 October through 11–20 November; about 52 recoveries were made per 10-day period. They decreased to about 13 recoveries per 10-day period through 11–20 April as did adults. After 20 April, no more than one adult and three immature recoveries were reported during any of the remaining 10-day periods.

The earliest direct recovery in Mexico (Jalisco) occurred during the 21–31 August period; it was an adult bird and was the only Mexican recovery during August. There were only two adult and 15 immature recoveries before October. Detection of differential arrival dates between the two age cohorts was precluded due to small samples during early stages of migration.

The arrival of CMU mourning doves in Mexico appeared to be well synchronized. The number of recoveries rose sharply during 11–20 October, at least 20% more for adults and 50% more for immatures than during any other 10-day period. These results agree closely with those of Blankenship and Reeves (1970).

Composite Evaluation

Doves from nearby States began entering Texas before September; the bulk of the population arrived later in September. Doves from northern States began entering Texas by mid-September; their peak occurred during late September and October.

Immature doves from nearby States entered North Texas sooner than adults. However, immature and adult doves from northern States arrived at about the same time. The early arrival of immatures from nearby States may have been more the result of pre-migratory movements of immatures than migration. Both adult and immature doves began arriving in wintering areas of southern Mexico during September, but peak arrival dates were during mid-October.

Survival and Recovery Rates

Estimated Survival and Recovery Rates

A common objective of banding studies is the estimation of parameters which reflect survival (Brownie et al. 1978). Anderson (1975), Anderson and Burnham (1976), and Burnham and Anderson (1979) described methods commonly used and accepted during earlier years to estimate such parameters and explained in detail their inadequacies. Early approaches were based on the deterministic life table concept and were biased and inefficient (Anderson 1975). The conceptualization and development of more efficient statistical methods to estimate survival are well documented (Brownie et al. 1978). These newer methods are based on stochastic models which permit the computation of sampling variances and covariances of the various estimators by using the Maximum Likelihood approach. Use of these models allows the precision of individual estimates to be statistically examined. Precision estimates are of value only when coupled with precision estimates from other cohorts, banding periods, geographical areas, etc. Stochastic models as described by Brownie et al. (1978) use such estimates in the development and testing of hypotheses which may lead to meaningful inferences.

Banding and recovery matrices for adult female, adult male, all adult (sexes combined), and immature mourning doves were assembled for each banding reference area in the CMU. We estimated survival and recovery parameters for the various cohorts using models in Brownie et al. (1978). All estimates presented may be considered as averages for selected years of banding. Absences of estimates indicate either insufficient or poorly distributed data. Estimates with low values in the goodness of fit tests ($P < 0.05$) indicate the data do not satisfy the assumptions of the model and are therefore subject to question. Recovery rates derived from these models are computed differently from traditional methods and should not be confused with the traditional definition of Recovery Rate (see Glossary).

Adult females. – Although data on sexes within each reference area were pooled (see Sex Related Differences), the data by sex class were also examined separately. Bandings and recoveries of adult females were generally insufficient for computation of survival rates; however, survival and recovery rates from 5 of 15 reference areas were estimated for adult female mourning doves by using program ESTIMATE (Table A-70). Female doves from South Dakota had the highest survival rate (59.1%) whereas those from Missouri had the lowest (33.2%). Some estimates were imprecise as indicated by high standard errors. Recovery rates ranged from 0.9% in Colorado to 2.2% in Missouri. Differences among reference areas were obvious, especially in recovery rates, and prevented the data from being pooled for analysis in this section. For the entire CMU the unweighted average survival rate was 51.0%, whereas the unweighted average recovery rate was 1.6%.

Adult males. – We calculated survival and recovery rates from 9 of 15 reference areas for adult male mourning doves using program ESTIMATE (Table A-71). Male doves from Nebraska had the highest survival rate (65.3%) and those from North Texas had the lowest (43.9%). Recovery rates ranged from 0.6% in Nebraska to 2.4% for doves banded in Missouri. For the entire CMU the unweighted average survival rate was 51.7% and the unweighted average recovery rate was 1.6%.

All adults. – Data from adult males and females were pooled within each reference area and subjected to program ESTIMATE. Survival and recovery rates were calculated for 13 of 15 reference areas (Table A-72). Adult doves from New Mexico had the highest survival rate (65.1%) and those from Arkansas had the lowest (31.5%). Recovery rates ranged from 0.6% for birds banded in North Dakota, Nebraska, and Iowa to 2.3% for those from Missouri.

For the entire CMU the unweighted average survival and recovery rates were 52.1 and 1.4%, respectively. The unweighted average survival rates for adult females, adult

males, and both sexes combined were 51, 52, and 52%, respectively; recovery rates of the three groups were 1.6, 1.6, and 1.4%, respectively.

Adults and immatures. – Survival and recovery rates for adult and immature doves were estimated for 11 of 15 reference areas by use of program BROWNIE (Tables A-73 and A-74).

For the entire CMU the unweighted average survival rates for adult and immature doves were 52.7 and 43.8%, respectively. Adult doves from New Mexico had the highest survival rate (66.4%) and those banded in Arkansas had the lowest (35.4%). Immature doves from Nebraska had the highest survival rate (67.8%) and those from Missouri had the lowest (26.1%).

The unweighted average recovery rates for adult and immature doves banded in the CMU were 1.5 and 2.0%, respectively. Adult doves from Missouri had the highest recovery rate (2.3%) and those banded in Nebraska and Iowa had the lowest (0.6%). Immature doves from Arkansas had the highest recovery rate (4.5%) and those from Nebraska and New Mexico had the lowest (0.8%).

Sex Related Differences

Banding and recovery data for adult male and female mourning doves from each State were analyzed to test the hypothesis that survival and recovery rates of the two cohorts were similar. If no differences are detected, then data from the two cohorts within each reference area can be pooled.

Differences in survival and recovery rates. – Banding and recovery data for adult males and females from each State were subjected to Option 1 of program BROWNIE. This program provides a chi-square contingency test for differences in survival and recovery rates between two cohorts. However, if differences are detected, it will not distinguish whether they are related to survival or recovery rates, or both.

Seven of 15 reference areas had insufficient data for testing. Bandings and recoveries of adult females were generally the weakest. No differences between adult males and adult females were detected in the eight reference areas tested (Table A-75). By summing individual test results and degrees of freedom, a composite test statistic was derived. No difference was detected.

Differences in survival rates. – Differences in survival rates between sexes were tested in 5 of 15 reference areas (Tables A-70 and A-71) by a 2-tailed Z-test (Brownie et al. 1978). Data from South Dakota indicated that males survived at a lower rate than females (50.0 vs. 59.1%; $P < 0.05$). Data from Missouri indicated males survived at a higher rate than females (48.1 vs. 33.2%; $P < 0.01$). No differences were detected in survival rates between males and females in Kansas (48.1 vs. 52.8%), Colorado (56.9 vs. 57.6%), and North Texas (43.9 vs. 52.4%). There was no difference in the composite test statistic which considered all areas equally.

Differences in recovery rates. – Differences in recovery rates between sexes were tested in the same manner as survival rates. Data from South Dakota indicated that males had a higher recovery rate than females (1.9 vs. 1.4%; $P < 0.01$). No differences were detected in each of the other four areas tested. All Z values were of the same sign, in favor of males having higher recovery rates, and the composite test statistic indicated males had a higher recovery rate than did females ($P < 0.01$).

A nonparametric matched-pairs signed-ranks test (Siegel 1956) was also used to test the hypothesis that direct recovery rates (see Glossary for differences between Recovery Rates and Direct Recovery Rates) of male mourning doves are similar to those of females. This test utilized more of the available data than either Option 1 of BROWNIE or the Z-test since the latter two utilized data from only 8 and 5 of 15 reference areas, respectively. Male and female direct recovery rates for each State and each year were used as the matched-pairs of data. Of the 110 usable matched-pairs, 63 (57%) indicated a higher recovery rate for males and 47 (43%) for females. The test failed to indicate a difference ($P > 0.10$).

Composite evaluation. – Although testing results are contradictory concerning differential survival and recovery rates due to sex, there probably were no real differences. This conclusion relates to the entire population and not to specific areas. Caution is suggested when inferences are drawn from data sets which are more restricted in scope than those used here.

Age Related Differences

A nonparametric matched-pairs signed-ranks test (Siegel 1956) was used to test the hypothesis that survival rates of adult mourning doves (Table A-73) were similar to those of immatures (Table A-74). The test indicated that the survival rates of adults and immatures differed ($P < 0.05$). Of the 11 areas used in the test, adults survived at a higher rate than immatures in all but Nebraska.

A similar test was used to compare recovery rates of adult and immature doves. Rather than using the estimated annual recovery rates provided by program BROWNIE, actual direct recovery rates for each year and reference area were used (data obtained from printout not provided in this report). This increased the number of paired observations from 11 to 117 and increased the power of the test. Of the 117 usable paired observations, 85 (73%) indicated a higher direct recovery rate for immatures and 32 (27%) indicated a higher rate for adults. The composite difference was significant ($P < 0.01$) and we conclude that immatures were recovered at a higher rate than adults.

Geographical Differences

Among Central Management Unit States. – Both the estimated annual recovery rates (Tables A-73 and A-74) and direct recovery rates (Table A-18) varied among reference

areas. Generally non-hunting States and the West–CMU tier of States had the lowest direct recovery rates (0.6 to 1.2%); South Dakota, Kansas, and Oklahoma had mid-range direct recovery rates (1.7 to 2.0%), whereas Missouri, Arkansas, and North and South Texas were relatively high (2.1 to 4.5%).

Survival estimates varied among reference areas (Tables A-72 to A-74). Because of the wide confidence intervals, individual estimates should be used cautiously. Most confidence intervals for survival estimates among States overlap and the true value could theoretically be the same for most States (Fig. 22). The data indicate a likelihood that survival rates of adult doves banded in Arkansas, Oklahoma, Missouri, and North and South Texas were lower than the remaining areas in the CMU (Table A-72).

Hunting vs. non-hunting States. – Survival rates of adult doves (Table A-72) banded in CMU States that allowed hunting were compared with those that did not. North Dakota, Minnesota, Nebraska, and Iowa were non-hunting States; Missouri, Kansas, Colorado, New Mexico, Oklahoma, Arkansas, North Texas, and South Texas were hunting States. Survival rates for Montana (non-hunting) and Wyoming (hunting) were not calculated because of insufficient recoveries. South Dakota was omitted as it reflected both hunting and non-hunting status.

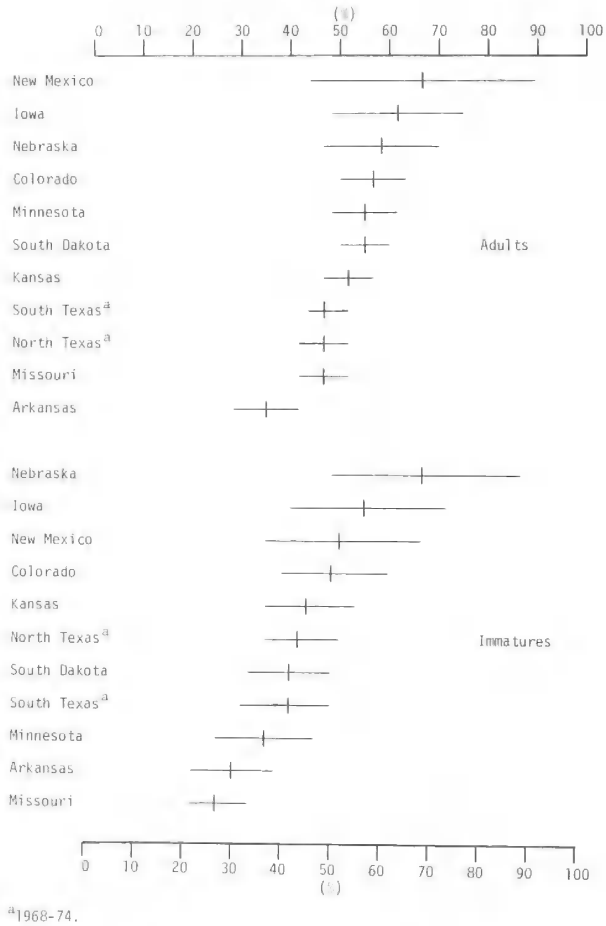
The average survival of adult mourning doves from program ESTIMATE was 58.1% in non-hunting States and 48.8% in hunting States (Table A-76). These estimates were subjected to a Z-test and the difference was significant ($P < 0.05$).

Similar procedures were followed using survival rates of adults and immatures from program BROWNIE (Tables A-73 and A-74). Data from North Dakota (non-hunting) and Oklahoma (hunting) were excluded (in addition to that from Montana, Wyoming, and South Dakota) because of insufficient recoveries. This loss of data was offset by the gain of an additional age cohort for comparison.

The average survival of adult doves was 58.1% in non-hunting States and 50.2% in hunting States and the average survival of immature doves was 52.9 and 40.2% in non-hunting and hunting States, respectively (Table A-76). The differences were significant ($P < 0.05$).

No attempt was made to correlate recovery rates with survival rates. When using data sets from different areas, the estimated survival rates should not be regressed with the estimated recovery rates because for each area the two estimates utilize the same data and therefore are not independent. Making such a direct comparison is a common tendency but is invalid (Anderson and Burnham 1976; Brownie et al. 1978).

These data suggest that mourning doves in non-hunting States have a higher survival rate than doves in hunting States. A similar conclusion was reported in the EMU by Hayne (1975). However, this conclusion may be misleading as the data may indicate geographic differences, such as north versus south, rather than differences in hunting practices.



[a]1968-74.

Fig. 22. Estimated survival rates of adult and immature mourning doves banded in the Central Management Unit, 1967–74.

Temporal Differences

Variations in survival and recovery rates among years were determined from data provided from program ESTIMATE. The goodness of fit test for Model 3 is synonymous with the test of the hypothesis that survival and recovery rates are constant. Chi-square tests of data for adult males, females, and both sexes combined were computed (Table A-77). Each composite test statistic indicated a rejection of the null hypothesis ($P < 0.01$). Therefore, survival and recovery rates were not constant from year to year.

Another facet within program ESTIMATE tests the hypothesis that direct recovery rates are constant among years. Chi-square tests of data for adult males, females, and both sexes combined were computed (Table A-78). Each composite test statistic indicated a rejection of the null hypothesis ($P < 0.01$). Therefore, direct recovery rates were not constant from year to year.

Testing for temporal variations in survival rates required a complex hypothesis (Anderson 1975). The hypothesis that recovery rates vary from year to year but survival is con-

stant was tested with data from Models 1 and 2 of program ESTIMATE. Although the power of this test is low and appropriate only if Model 1 fits ($P > 0.05$), four of nine reference areas tested indicated a rejection ($P < 0.05$) of the hypothesis (Table A-79). The composite test also indicated a rejection; therefore, annual survival rates were not constant.

Life Equation

Mathematical models relating mortality rates to recruitment rates necessary for maintaining stable populations are referred to as life equations and have been described by Henny et al. (1970). Using survival estimates for adult and immature doves (Tables A-73 and A-74), we computed the amount of production needed to compensate for annual mortality to maintain a constant breeding population for each State (Table A-80). The production requirement ranged from 1.2 (Nebraska) to 4.4 (Arkansas) young per pair of breeding adults. The production requirement in the entire CMU was 2.2 young per pair of breeding adults.

A compilation of 17 mourning dove nesting studies across the United States (U.S. Department of the Interior 1977) indicated the average number of fledglings produced per pair of adults was 3.3 in northern latitude States, 4.4 in mid-latitude States, and 3.7 in southern latitude States. The overall average was 4.0 fledglings per pair of breeding adults. The estimated amount of production required to maintain a constant breeding population seems well within the measured capabilities reported in the literature.

Differential Vulnerability

Immature mourning doves consistently had higher direct recovery rates than adults. The difference between these rates is attributed to differential vulnerability between the age classes. Relative recovery rates were calculated for each State in the CMU and averaged for the unit (Table A-81). The relative recovery rate varied from 0.87 for Kansas to 2.90 for Montana among CMU States, but the high rates for Montana and Wyoming were probably due to low sample sizes. Excluding data from those two States, the average relative recovery rate for the CMU was about 1.3. Thus, immatures were slightly more vulnerable to hunter harvest than adults. This value can be used to adjust age ratios obtained from hunting season wing collection surveys to reflect the true preseason proportions of young to adult mourning doves in the CMU.

Proportion of Population Removed by Hunting

Each year, hunting removes a large number of mourning doves from the population. Ruos and Tomlinson (1968) estimated that 41 million mourning doves were harvested in the United States in 1965. Keeler (1977) compiled data from various sources and estimated about 49 million birds killed in 1972.

The proportion of the CMU dove population which died during the 1967–74 period due to hunting was calculated by using the method described by Geis (1972). Kill rates for adults and immatures were calculated by adjusting the recovery rates (Tables A-73 and A-74) for adults and immatures. A reporting rate of 45% (Reeves 1979) and a crippling rate of 30% (Winston 1954; Dahlgren 1955; Shaw 1956; Nelson 1957; Haas 1977) were used as the adjusting factors. The kill rates for adult and immature doves from the CMU were 4.7 and 6.3%, respectively. Therefore, the estimated proportion of total mortality (47.3% for adults and 56.2% for immatures) due to hunting was 9.9 and 11.2%, respectively (Table A-82).

Anderson and Burnham (1976) reported the effect that hunting had on mallard (*Anas platyrhynchos*) populations and tested the concept of hunting being completely compensatory to other forms of annual mortality. They reviewed the literature and found most conclusions regarding hunting mortality as additive mortality were based on incorrect and inappropriate methods. They rejected the concept of hunting being completely additive to other mallard mortality but could not reject the concept of hunting being completely compensatory. In the mallard study, 40–50% of the birds dying in any given year were killed by hunters (Anderson 1975). This mortality was largely, if not completely, compensatory. Although the kill rate level which will adversely affect mourning dove populations is unknown, it is difficult to conceive that hunting has adversely affected a mourning dove population that sustains a hunting mortality that is only 10–11% of the total mortality.

Indirect Population Estimates

The abundance and distribution of the mourning dove breeding population is annually described in the form of an index (Dolton 1977). For evaluating trends in the population, this method is sufficient. However, indices are difficult to compare with other estimates such as harvest and disease losses which are expressed as absolute numbers. For this reason, data derived from this banding analysis were coupled with harvest data to estimate, numerically, the CMU and nationwide mourning dove fall flight populations. These estimates are founded on broad assumptions and should be viewed cautiously.

The basis for this computation is to derive two essentially independent estimates of the kill of mourning doves from a defined geographical area. One estimate employs banding data to project the proportion of the total population killed by hunters. The other estimate employs harvest and banding data to project the absolute value of this kill. By dividing the second value by the former, an absolute value for the total population is obtained. This procedure was discussed by Geis (1972) and used by Dunks (1977) in projecting the Texas mourning dove population.

The fall flight estimates are strongly dependent on an estimate of the band reporting rate. The 32% band reporting rate (Tomlinson 1968) was used rather than the 45%

rate (Reeves 1979) in order for the estimate to be more conservative and comparable to those made by Dunks (1977).

Only five States in the CMU (Colorado, Kansas, Missouri, New Mexico, and Oklahoma) conducted mourning dove harvest surveys during each year of the 8-year banding program. Thus, harvest data from these States (Table A-2) were used to estimate fall flight populations for each as described above. Nationwide population estimates then were projected by dividing each of the five State's population estimates by their respective importance values provided in Table A-1.

These projections ranged from 350 to 600 million doves for the combined 48 conterminous States. The five estimates then were summed and an average value of 476 million doves was computed. This nationwide estimate was multiplied by the three management unit importance values to obtain population values for each. The estimated fall flight populations were 120 million for the EMU, 265 million for the CMU, and 91 million for the WMU.

The range of 350 to 600 million mourning doves in the United States encompasses earlier estimates of the nationwide fall flight population. Dunks (1977) reported 475 million; R. E. Tomlinson (unpublished report) reported 600 million; and an environmental impact statement for the hunting of migratory game birds (U.S. Department of the Interior 1975) reported 500 million.

Bird populations of this size are difficult to estimate and comprehend. For management concerns, it is often more assuring to know the relative abundance of a species than to know the actual numbers. Comprehensive breeding bird surveys were conducted in the United States and Canada in 1967 and 1968; the results indicated that the mourning dove was one of the most abundant bird species in North America (Robbins and Van Velzen 1969). The number of mourning doves was surpassed only by the robin (*Turdus migratorius*), starling (*Sturnus vulgaris*), house sparrow (*Passer domesticus*), red-winged blackbird (*Agelaius phoeniceus*), and common grackle (*Quiscalus quiscula*). An

I. Estimating the number of mourning doves killed from the fall flight population

Step	Colorado	Kansas	Missouri	New Mexico	Oklahoma
1. Average State dove harvest, 1967–74	383,000	1,342,000	1,156,000	277,000	1,444,000
2. Average State kill, assuming 30% crippling loss [Step 1 ÷ (1 – 0.30)]	547,000	1,917,000	1,651,000	396,000	2,063,000
3. Proportion of State kill derived from within the State (derivation from Table A-57)	0.63	0.94	0.94	0.58	0.90
4. Kill of State-reared doves in State (Step 2 × Step 3)	345,000	1,802,000	1,552,000	230,000	1,857,000
5. Proportion of doves banded in State that are recovered in State (% distribution from Table A-28)	0.52	0.65	0.73	0.64	0.57
6. Total kill of State's birds (Step 4 ÷ Step 5)	663,000	2,772,000	2,126,000	359,000	3,257,000
II. Estimating the percentage of doves killed from fall flight populations					
1. Total doves banded (Table A-12)	29,253	21,889	20,966	26,245	16,201
2. Total direct recoveries as the result of hunting (Table A-18)	283	379	667	202	316
3. Direct recovery rate as the result of hunting (Step 2 ÷ Step 1)	0.0097	0.0173	0.0318	0.0077	0.0195
4. Harvest rate if band reporting rate is assumed to be 32% (Step 3 ÷ 0.32)	0.0302	0.0541	0.0994	0.0241	0.0610
5. Kill rate if crippling loss is assumed to be 30% [Step 4 ÷ (1 – 0.30)]	0.0432	0.0773	0.1420	0.0344	0.0871
III. Estimating fall flight populations					
1. State's fall flight population (I, Step 6 ÷ II, Step 5)	15,347,000	35,860,000	14,972,000	10,436,000	37,394,000
2. State's breeding index or importance (Table A-1)	0.026	0.075	0.041	0.027	0.067
3. Fall flight population of 48 conterminous States, projected from State's estimates (Step 1 ÷ Step 2)	590,000,000	478,000,000	365,000,000	387,000,000	558,000,000
4. Average fall population of 48 conterminous States (sum of estimates in Step 3 ÷ 5)			476,000,000		
5. If total population is 476 million, the population of each management unit is	EMU = 120,000,000		CMU = 265,000,000		WMU = 91,000,000

intensive survey of breeding birds in North Dakota was reported by Stewart and Kantrud (1972), which indicated that the mourning dove was the twelfth most common avian species in that State. The mourning dove was surpassed only by (in decreasing order) the horned lark (*Eremophila alpestris*), chestnut-collared longspur (*Calcarius ornatus*), red-winged blackbird, western meadowlark (*Sturnella neglecta*), lark bunting (*Calamospiza melanocorys*), savannah sparrow (*Passerculus sandwichensis*), brown-headed cowbird (*Molothrus ater*), clay-colored sparrow (*Spizella pallida*), American coot (*Fulica americana*), blue-winged teal (*Anas discors*), and grasshopper sparrow (*Ammodramus savannarum*).

Considering the extensive breeding range, adaptability to many habitat types, large fall flight estimates, and high relative abundance to other avian species, the North American and CMU populations of mourning doves are and should continue to be of tremendous importance as a natural renewable resource.

Summary

1. Over 868,000 mourning doves were banded throughout the United States between 1967 and 1975. Of these, 332,314 were banded in the CMU.

2. Of nearly 146,000 adults banded in the CMU whose sex and age were determined, the sex ratio was 187:100, males to females; the age ratio was 121:100, immatures to adults.

3. Of 5,266 direct mourning dove recoveries from CMU bandings, 4,134 (79%) were taken in the CMU, 792 (15%) in the Southern Zone, 292 (6%) in the EMU, and 48 (1%) in the WMU.

4. In general, half or more of all dove recoveries occurred in the State of banding for those States where hunting was permitted.

5. The pattern of migration for doves banded in the CMU is generally southward and shaped like a fan. Doves originating in northern latitudes exhibited greater probabilities of being recovered in the EMU and WMU than doves originating in southern latitudes.

6. Doves banded in States adjacent to the EMU and WMU had a stronger tendency to migrate into the adjacent unit that those from other CMU States.

7. Doves banded in Iowa, Missouri, Arkansas, and South Texas had a lower probability of migrating into Mexico than doves banded in other areas of the CMU.

8. Adult female doves either migrated earlier or were more prone to migrate from the State of banding than adult males. Likewise, immature doves either migrated earlier or were more prone to migrate than adults.

9. Of the total CMU harvest, over half occurred in Texas (44%) and Oklahoma (10%). Missouri (13%) and Kansas (11%) accounted for almost one-fourth of the CMU harvest. South Texas and Missouri had the highest harvests per land unit area.

10. Of doves originating in the United States and harvested in the Southern Zone, 89% occurred in Mexico and 11% in Central America.

11. Of doves originating in the United States and harvested in Mexico, 73% occurred in the three-State area of Jalisco, Guanajuato, and Michoacan.

12. No doves banded in the United States were recovered in the Yucatan Peninsula. Thus, migratory routes follow the Pacific coastline once birds reach southern Mexico.

13. Costa Rica appears to be the southward terminus for migrating doves from the United States.

14. The harvest in most CMU hunting States consisted of doves that nested or were hatched in those States, and less than 10% of the harvested birds originated from other States. However, in Colorado, New Mexico, and Texas, 40% or more of the harvested doves came from other States.

15. Of the total dove harvest in the CMU, nearly 98% originated from within the CMU and less than 3% from the WMU and EMU combined.

16. Of doves originating in the United States and harvested in Mexico, 75% originated in CMU States, 23% in WMU States, and less than 2% in EMU States.

17. Of doves originating in the United States and harvested in Central America, 96% were contributed by CMU States, particularly the Mid–CMU (North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas).

18. Immature doves banded in June were recovered out of State in greater proportion than immatures banded in August. Thus, immature doves probably began dispersing soon after fledging. Adults did not exhibit this tendency.

19. Doves from adjacent States began entering Texas before September, but the bulk of the population arrived later in September. Doves from northern States arrived in Texas later than those from nearby States.

20. Immature doves from nearby States entered Texas sooner than adults, but adults and immatures from northern States arrived at about the same time.

21. Mourning dove recoveries were obtained in Mexico from September through mid-April; peak recovery was in mid-October.

22. Adult and immature doves appear to arrive in Mexico at about the same time.

23. Although more advanced than earlier methods, the stochastic models used in this analysis were limited in their ability to provide mourning dove survival and recovery rate estimates with acceptable precision because of stringent requirements of the models.

24. Mourning dove survival and recovery rates were not constant from year to year.

25. No overall differences in either survival or recovery rates were detected between adult male and female doves.

26. The unweighted average survival rate for doves banded in the CMU was 53% for adults and 44% for immatures.

27. Doves banded as adults survived at a higher rate ($P < 0.05$) than doves banded as immatures, regardless of origination area.

28. The unweighted average recovery rate for doves banded in the CMU was 1.5% for adults and 2.0% for immatures.

29. Doves banded as immatures were recovered at a higher rate ($P < 0.01$) than doves banded as adults.

30. Doves banded in non-hunting States and the West–CMU (Montana, Wyoming, Colorado, and New Mexico) had the lowest direct recovery rates (0.6 to 1.2%); South Dakota, Kansas, and Oklahoma had mid-range direct recovery rates (1.7 to 2.0%); Missouri, Arkansas, and North and South Texas had relatively high rates (2.1 to 4.5%).

31. Doves banded in States with hunting seasons (southern States) had a lower survival rate than doves banded in States without hunting seasons (northern States).

32. The amount of production needed to compensate for annual mortality to maintain a constant breeding dove population in the CMU was 2.2 young per pair of breeding adults, well below the reported production of 3.3 to 4.4.

33. Immature doves had higher direct recovery rates and were thus more vulnerable to hunter harvest than adults. The average relative recovery rate for the CMU was 1.3 immatures per adult.

34. The kill rates for adults and immatures were 4.7 and 6.3%, respectively. Therefore, the estimated proportion of total mortality (47.3% for adults and 56.2% for immatures) due to hunting was 9.9 and 11.2%, respectively.

35. It is concluded that hunting has not adversely affected the mourning dove population in the CMU.

36. The average fall flight population of mourning doves for the 48 conterminous States was estimated to be between 350 and 600 million birds.

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Appendix A

Tables A-1 to A-82

An unusually large number of tables has been provided in this publication to allow readers to use the information for more detailed analyses of data for smaller areas or for different combinations of States than provided. We have positioned all of the tables in one appendix to allow readers to quickly thumb through them for specific data. We think this treatment is more convenient than scattering tables throughout the text.

Table A-1. Relative importance of mourning dove breeding populations in the U.S., 1967-75[a].

Breeding area	Land area weight[b]	Mean no. of doves per route[c]	Breeding population index	Importance (%)
West-WMU				
Washington	43.87	9.19	403.17	1.0
Oregon	62.27	10.23	637.02	1.6
Nevada	71.27	12.48	889.45	2.2
California	101.71	13.68	1,391.39	3.5
Subtotals	279.12 (14.5)		3,321.03	8.3
East-WMU				
Idaho	54.37	11.86	644.83	1.6
Utah	53.34	11.63	620.34	1.5
Arizona	72.65	42.34	3,076.00	7.7
Subtotals	180.36 (9.4)		4,341.17	10.8
WMU totals	459.48 (23.9)		7,662.20	19.1
West-CMU				
Montana	94.47	10.63	1,004.22	2.5
Wyoming	62.33	10.61	661.32	1.6
Colorado	67.18	15.65	1,051.37	2.6
New Mexico	77.98	14.14	1,102.64	2.7
Subtotals	301.96 (15.7)		3,819.55	9.5
Mid-CMU				
North Dakota	45.54	29.07	1,323.85	3.3
South Dakota	49.20	33.49	1,647.71	4.1
Nebraska	49.69	42.65	2,119.28	5.3
Kansas	52.43	57.30	3,004.24	7.5
Oklahoma	44.40	60.64	2,692.42	6.7
North Texas	127.83	18.50	2,364.86	5.9
South Texas	42.20	27.00	1,139.40	2.8
Subtotals	411.29 (21.4)		14,291.76	35.6
East-CMU				
Minnesota	54.09	12.15	657.19	1.6
Iowa	36.15	31.59	1,141.98	2.8
Missouri	45.10	36.25	1,634.88	4.1
Arkansas	34.37	22.44	771.26	1.9
Subtotals	169.71 (8.8)		4,205.31	10.5
CMU totals	882.96 (46.0)		22,316.62	55.6
EMU				
Maine	19.85	0.24	4.76	Tr
Rhode Island	0.67	9.98	6.69	Tr
Massachusetts	5.31	6.54	34.73	0.1
New Hampshire	5.80	2.39	13.86	Tr
Vermont	5.95	0.36	2.14	Tr
New York	30.49	10.54	321.36	0.8
Connecticut	3.23	7.64	24.68	0.1
New Jersey	4.91	19.37	95.11	0.2
Pennsylvania	29.01	10.24	297.06	0.7
Michigan	37.18	7.73	287.40	0.7
Wisconsin	36.07	11.71	422.38	1.1
Illinois	35.09	26.93	944.97	2.4
Indiana	23.36	28.39	663.19	1.7
Ohio	26.42	33.38	881.90	2.2
West Virginia	15.41	5.30	81.67	0.2
Maryland	6.55	19.52	127.86	0.3
Delaware	1.29	20.98	27.06	0.1
Virginia	26.05	24.66	642.39	1.6
Kentucky	26.08	25.69	670.00	1.7
Tennessee	27.07	19.31	522.72	1.3
North Carolina	22.51	28.10	632.53	1.6
South Carolina	19.99	27.96	558.92	1.4
Georgia	37.82	22.12	836.58	2.1
Alabama	33.32	21.34	711.05	1.8
Mississippi	30.63	24.46	749.21	1.9
Louisiana	31.14	6.72	209.26	0.5
Florida	35.82	11.26	403.33	1.0
EMU totals	577.02 (30.1)		10,172.81	25.3
U.S. totals	1,919.46(100.0)		40,151.63	100.0

[a]CMU data taken from 1967-74 period.
[b]Figures in parentheses indicate percentage.
[c]Adjusted to a base year.

Table A-2. Mourning dove harvest in the Central Management Unit, 1967-76[a].

State	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	Average
Montana	← NO MOURNING DOVE SEASON →										--
North Dakota	← NO MOURNING DOVE SEASON →										--
Minnesota	← NO MOURNING DOVE SEASON →										--
South Dakota	140,000	105,000	160,000	213,000	205,000	226,000	← NO MOURNING DOVE SEASON →				175,000
Wyoming	← NO MOURNING DOVE SEASON →						15,865	30,510	43,206	54,725	36,000
Nebraska	← NO MOURNING DOVE SEASON →								839,582	884,756	862,000
Iowa	← NO MOURNING DOVE SEASON →										--
Missouri	720,000	840,000	1,138,000	1,020,000	1,240,000	1,387,000	1,520,000	1,380,000	1,529,000	1,717,000	1,249,000
Kansas	1,013,000	1,183,000	1,312,000	1,304,000	1,363,000	1,556,000	1,333,000	1,668,000	1,448,000	1,694,000	1,388,000
Colorado	140,200	308,900	323,780	301,560	298,770	513,900	484,660	688,310	639,907	492,927	419,000
New Mexico	201,400	263,950	256,935	289,490	277,770	265,030	312,310	346,260	427,580	310,500	295,000
Oklahoma	1,238,100	1,365,900	1,368,910	1,701,280	1,293,000	1,722,800	1,377,700	1,481,600	1,278,631	1,618,408	1,445,000
Arkansas	← NO SURVEY →										1,347,000[b]
Texas	← NO SURVEY →				6,931,000	7,106,000	5,154,000	4,902,590	4,799,057	NO SURVEY	5,779,000
Total											12,995,000

[a]Estimated by individual States from statewide surveys of a percentage of small game license holders.
[b]AR total arbitrarily estimated as an average of the MO and OK harvests.

Table A-3. Summary of mourning dove hunting regulations in the Central Management Unit, 1967-76.

State	Seasons 1967	1968	1969	1970	1971
Montana	Closed	Closed	Closed	Closed	Closed
North Dakota	Closed	Closed	Closed	Closed	Closed
Minnesota	Closed	Closed	Closed	Closed	Closed
South Dakota	1-5 Sept.	1-8 Sept.	1-14 Sept.	1-14 Sept.	1-14 Sept.
Wyoming	Closed	Closed	Closed	Closed	Closed
Nebraska	Closed	Closed	Closed	Closed	Closed
Iowa	Closed	Closed	Closed	Closed	Closed
Missouri	1 Sept.-10 Oct. 10 Nov. -29 Nov.	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.
Kansas	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.
Colorado	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.
New Mexico[a]	1 Sept.- 1 Oct. 2-30 Dec.	1 Sept.-30 Oct.	1-30 Sept. 29 Nov. -28 Dec.	1-30 Sept. 28 Nov. -27 Dec.	1-30 Sept. 27 Nov. -26 Dec.
Oklahoma	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.
Arkansas	1 Sept.- 5 Oct. 18 Dec. -11 Jan.	1 Sept.- 5 Oct. 18 Dec. -11 Jan.	1 Sept.- 5 Oct. 18 Dec. -11 Jan.	1 Sept.- 5 Oct. 1-25 Dec.	1 Sept.- 5 Oct. 1-25 Dec.
Texas					
North	1 Sept.-30 Oct.[b]	1 Sept.-30 Oct.[b]	1 Sept.-30 Oct.[b]	1 Sept.-30 Oct.[b]	1 Sept.-30 Oct.[b]
Lower Rio Grande Valley	2,3,9,10 Sept. 23 Sept.-17 Nov.	1,2,7,8 Sept. 21 Sept.-15 Nov.	6,7 Sept. 20 Sept.-16 Nov.	5,6,12,13 Sept. 26 Sept.-20 Nov.	4,5,11,12 Sept. 25 Sept.-19 Nov.
Remainder	23 Sept.-21 Nov.	21 Sept.-19 Nov.	20 Sept.-18 Nov.	26 Sept.-24 Nov.	25 Sept.-23 Nov.
Limits	12/24	12/24	10/20	10/20	10/20
Shooting hours	← One-half hour before sunrise to sunset →				

State	Seasons 1972	1973	1974	1975	1976
Montana	Closed	Closed	Closed	Closed	Closed
North Dakota	Closed	Closed	Closed	Closed	Closed
Minnesota	Closed	Closed	Closed	Closed	Closed
South Dakota	1-17 Sept.[c]	Closed	Closed	Closed	Closed
Wyoming	Closed	1-16 Sept.	1-22 Sept.	1-30 Sept.	1-30 Sept.
Nebraska	Closed	Closed	Closed	1-30 Sept.	1 Sept.-15 Oct.[d]
Iowa	Closed	Closed	Closed	Closed	Closed
Missouri	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.
Kansas	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.
Colorado	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.
New Mexico[a]	1-30 Sept. 18 Nov. -17 Dec.	1-30 Sept. 24 Nov. -23 Dec.	1-30 Sept. 23 Nov. -22 Dec.	1-30 Sept. 27 Nov. -26 Dec.	1 Sept.-30 Oct.
Oklahoma	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.	1 Sept.-30 Oct.
Arkansas	1 Sept.- 5 Oct. 1-25 Dec.	1 Sept.- 5 Oct. 15 Dec. - 8 Jan.	1 Sept.- 5 Oct. 15 Dec. - 8 Jan.	1 Sept.- 5 Oct. 15 Dec. - 8 Jan.	1 Sept.- 5 Oct. 15 Dec. - 8 Jan.
Texas					
North	1 Sept.-14 Oct.[b] 6-21 Jan.	1 Sept.-14 Oct.[b] 5-20 Jan.	1 Sept.-30 Oct.[b]	1 Sept.-30 Oct.[b]	1 Sept.-14 Oct.[b] 1-16 Jan.
Lower Rio Grande Valley	2-4 Sept. 23 Sept.- 2 Nov. 6-21 Jan.	1,2,8,9 Sept. 22 Sept.-31 Oct. 5-20 Jan.	1,2,7,8 Sept. 21 Sept.-30 Oct. 4-19 Jan.	1,2,5-7,13,14 Sept.[b] 20 Sept.-26 Oct.[b] 3-18 Jan.	4-6,11,12 Sept.[b] 25 Sept.- 2 Nov.[b] 1-16 Jan.
Remainder	23 Sept.- 5 Nov. 6-21 Jan.	22 Sept.- 4 Nov. 5-20 Jan.	21 Sept.- 3 Nov. 4-19 Jan.	20 Sept.- 2 Nov.[b] 3-18 Jan.	25 Sept.- 7 Nov.[b] 1-16 Jan.
Limits	10/20	10/20	10/20	10/20	10/20
Shooting hours	← One-half hour before sunrise to sunset →				

[a]Aggregate bag and possession limits of mourning doves and white-winged doves apply in counties having a white-winged dove season.
[b]Shooting hours, noon to sunset.
[c]Shooting hours, sunrise to sunset.
[d]Shooting hours, 15 minutes before sunrise to sunset.

Table A-4. Summary of mourning dove hunting regulations in Mexico, 1967-77.

Hunting year	Season dates	Bag and possession	Location
1967-68	28 August to 31 October	15	Northern part of Republic
	1 December to 31 March	15	Morelos and Puebla
	1 October to 31 December	5 (Sat. and Sun. only)	Tlaxcala
	1 October to 31 December	10	Rest of Republic
1968-69	28 August to 31 October	15	Northern part of Republic
	1 November to 31 January	15	Jalisco and contiguous states
	28 August to 31 October	15	All Baja California, Sonora, and Sinaloa
	15 December to 31 January	15	" " " " " "
	1 October to 31 December	5 (Sat. and Sun. only)	Tlaxcala
	1 October to 31 December	10	Rest of Republic
1969-70	1 August to 30 September	15	Baja California, Sinaloa, and Sonora
	1 October to 31 October	10	" " " "
	15 December to 31 December	15	" " " " "
	1 August to 30 September	15	Chihuahua, Coahuila, Tamaulipas, and Nuevo León
	1 October to 31 October	10	" " " " " "
	1 October to 31 October	10	Jalisco
	1 December to 31 December	15	"
	1 October to 31 October	10	Morelos and southern Puebla
	1 November to 31 March	15	" " " "
	1 November to 31 December	15	Tlaxcala
	1 January to 31 January	5 (Sat. and Sun. only)	"
	1 October to 31 October	10	Rest of Republic
	1 November to 28 February	15	" " "
1970-71	1 August to 30 September	15	Chihuahua, Coahuila, Tamaulipas, and Nuevo León
	1 October to 31 October	10	" " " " " "
	15 August to 15 October	15	State of Baja California
	1 January to 15 February	15	" " " "
	15 August to 15 October	15	Territory of Baja California
	1 January to 31 January	15	" " " "
	15 August to 30 September	15	Sonora
	1 October to 31 October	10	"
	1 January to 15 February	15	"
	1 August to 30 September	15	Sinaloa
	1 October to 30 October	10	"
	15 December to 31 December	15	"
	1 October to 31 October	10	Jalisco
	1 November to 30 November	15	"
	15 December to 28 February	15	"
	1 October to 31 October	10	Morelos and southern Puebla
	1 November to 31 March	15	" " " "
	1 November to 31 December	15	Tlaxcala
	1 January to 31 March	5 (Sat. and Sun. only)	"
	1 October to 31 October	10	Rest of central and southern part of Republic
	1 November to 28 February	15	" " " " " " "
	1 October to 31 October	10	Yucatán Peninsula
	1 April to 30 April	15	" "
	1 October to 30 October	10	Rest of Republic
1971-72	1 August to 28 February	10 (Mon. through Fri.) 15 (Sat. and Sun.)	Entire Republic " "
1972-73	1 September to 28 February	15 (Mon. through Fri.) 20 (Sat. and Sun.)	Entire Republic " "
1973-74	1 November to 28 February	15	Entire Republic
1974-75	1 September to 31 January	20	Baja California
	1 September to 28 February	20	Sonora and Sinaloa
	1 November to 31 March	15	Rest of Republic
1975-76	1 November to 31 March	15 and 30	Morelos and Guerrero
	15 August to 31 March	15 and 30	Rest of Republic (in Baja California, hunting forbidden in certain areas)
1976-77	1 September to 31 March	15 and 30	Baja California Peninsula (hunting forbidden in certain areas)
	1 October to 31 March	15 and 30	Jalisco
	1 August to 31 March	15 and 30	Rest of Republic

Table A-5. Mourning dove harvest areas of the Southern Zone.

Area	Name	Description[a]
Mexico		
1	Northwest Coast	Baja California, Sonora, Sinaloa, and Nayarit
2	Northern Highlands	Chihuahua, Durango, Zacatecas, and Aguascalientes
3	Northeast Coast	Coahuila, Nuevo Leon, Tamaulipas, and San Luis Potosi
4	Western Highlands	Jalisco, Guanajuato, Colima, Michoacan, and Guerrero
5	Central Highlands	Queretaro, Hidalgo, Mexico, Mexico D.F., Tlaxcala, Morelos, and Puebla
6	Southern Mexico	Veracruz, Oaxaca, and Chiapas
7	Yucatan Peninsula	Tabasco, Campeche, Yucatan, Quintana Roo, and Belize
Central America		
8	Guatemala	Guatemala
9	El Salvador	El Salvador
10	Honduras	Honduras
11	Nicaragua	Nicaragua
12	Costa Rica	Costa Rica

[a]Mexican States and Central American countries. Belize is included in the Yucatan Peninsula of Mexico for convenience.

Table A-6. Criteria for identifying Bird Banding Laboratory records used in the analysis of Central Management Unit mourning dove banding and recovery data.

Banding summary file	
AOU no.:	316.
State:	All 48 conterminous States.
Year:	1967-75 (1967-74 in CMU).
Permit:	All.
Month:	1 June-31 August.
Day:	All, reformatted.
Status:	3 (normal wild bird).
Age:	1 (AHY, adult), 2 (HY, immature).
Sex:	4 (male), 5 (female), 6 (unknown).
Flyway:	Central and parts of Mississippi reformatted to the CMU, Atlantic, and Pacific.
Latitude:	All in U.S.
Longitude:	All in U.S.
Direction:	All.
Schedule or prefix:	All.

Recovery file	
The recovery file contains all elements in the banding summary file through column 33, as described above. In addition, the following elements contained only in the recovery file were used in selecting records.	
Date recovered:	In hunting season only, defined as follows: U.S., 1 Sept.-31 Jan.; Southern Zone (Mexico and Central America), 1 Aug.-31 May. All exact dates, plus all inexact dates, identifiable to acceptable months during recovery years 1967-77.
How obtained:	00 (found dead), 01 (shot), 56 (obtained in hunting season), and 98 (band or band number only in hunting season). In the Southern Zone, all "How obtained" recoveries were used.
Who reported:	All.
Why reported:	All.
Where recovered:	For CMU bandings, all; for EMU and WMU bandings, only those in CMU and Southern Zone.
Band type:	All.
Present condition:	All.

Table A-7. Summary of band recoveries by "How obtained" codes[a] of mourning doves banded in the U.S., 1967-75[b].

Recoveries No.	Recoveries %	"How obtained" code	Code definition
8,802	96.1	01	Shot.
83	0.9	00	Found dead.
47	0.5	98	Band or band number only obtained. No further information available.
28	0.3	03	Caught due to: injury.
17	0.2	14	Caught due to: striking or being struck by motor vehicle.
5	0.1	89	Previously banded bird trapped and released during banding operations in different 10-minute block than where originally banded.
5	0.1	12	Caught by or due to: cat.
4	0.0	99	Previously banded bird trapped and released during banding operations in same 10-minute block where originally banded.
4	0.0	20	Caught due to: disease.
163	1.8	Other	Miscellaneous means of recovery.

[a]As described in Volume I of the North American Bird Banding Manual, 1972.
[b]1967-74 in CMU.

Table A-8. Direct recoveries inside and outside State of banding by 10-day banding periods for immature mourning doves banded in hunting States, Central Management Unit, 1967-74[a].

State banded	June			July			August			Totals
	1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-31	
South Dakota										
Inside	2	3	23	31	45	54	37	15	6	216
Outside	0	8	33	52	37	40	22	6	2	200
% inside	100	27	41	37	55	57	63	71	75	52
Missouri										
Inside	7	12	23	15	24	46	54	81	72	334
Outside	4	4	14	16	19	32	29	17	17	152
% inside	64	75	62	48	56	59	65	83	81	69
Kansas										
Inside	3	17	12	2	3	10	10	11	3	71
Outside	2	13	11	7	5	13	12	8	1	72
% inside	60	57	52	22	38	43	45	58	75	50
Colorado										
Inside	0	3	4	6	6	8	15	13	1	56
Outside	0	7	9	14	13	14	13	13	1	84
% inside	0	30	31	30	32	36	54	50	50	40
New Mexico										
Inside	1	2	1	6	7	13	26	16	3	75
Outside	2	1	7	9	5	17	7	7	2	57
% inside	33	66	13	40	58	43	79	70	60	57
Oklahoma										
Inside	0	0	2	3	3	15	30	51	35	139
Outside	0	0	2	4	7	22	35	32	15	117
% inside	0	0	50	43	30	41	46	61	70	54
Arkansas										
Inside	6	8	11	11	18	33	52	95	41	275
Outside	1	3	5	0	3	10	10	4	8	44
% inside	86	73	69	100	86	77	84	96	84	86
North Texas										
Inside	32	34	35	47	40	56	64	34	14	356
Outside	7	8	12	14	19	9	12	9	4	94
% inside	82	81	74	77	68	86	84	79	78	79
South Texas										
Inside	11	18	16	16	28	21	11	23	16	160
Outside	2	6	4	9	5	10	1	2	2	41
% inside	85	75	80	64	85	68	92	92	89	80

[a]Excludes WY data because of insufficient recoveries.

Table A-9. Direct recoveries inside and outside State of banding by 10-day banding periods for adult mourning doves banded in hunting States, Central Management Unit, 1967-74[a].

State banded	June			July			August			Totals
	1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-31	
South Dakota										
Inside	15	40	91	54	57	51	23	15	2	348
Outside	11	23	46	30	18	20	5	0	0	153
% inside	58	63	66	64	76	72	82	100	100	69
Missouri										
Inside	16	11	20	8	28	26	13	15	14	151
Outside	1	4	3	2	2	4	6	4	4	30
% inside	94	73	87	80	93	87	68	79	78	83
Kansas										
Inside	63	50	28	15	5	2	8	2	1	174
Outside	22	16	8	3	2	2	3	5	1	62
% inside	74	76	78	83	71	50	73	29	50	74
Colorado										
Inside	8	19	21	16	9	7	6	4	0	90
Outside	3	15	14	5	10	4	2	0	0	53
% inside	73	56	60	76	47	64	75	100	0	63
New Mexico										
Inside	11	8	4	4	3	8	13	4	0	55
Outside	3	0	1	2	2	2	1	3	1	15
% inside	79	100	80	67	60	80	93	57	0	79
Oklahoma										
Inside	1	1	2	3	4	4	10	12	3	40
Outside	0	0	0	0	3	6	7	4	0	20
% inside	100	100	100	100	57	40	59	75	100	67
Arkansas										
Inside	2	5	8	10	7	14	17	21	4	88
Outside	2	0	1	3	1	4	2	2	0	15
% inside	50	100	89	77	88	78	89	91	100	85
North Texas										
Inside	118	63	43	45	33	14	17	13	4	350
Outside	9	8	5	4	2	4	5	0	0	37
% inside	93	89	90	92	94	78	77	100	100	90
South Texas										
Inside	23	23	19	11	16	18	6	7	4	127
Outside	0	2	1	2	0	0	0	0	0	5
% inside	100	92	95	85	100	100	100	100	100	96

[a]Excludes WY data because of insufficient recoveries.

Table A-10. Proportion of immature mourning dove direct band recoveries occurring inside State of banding by banding period in hunting States[a], Central Management Unit, 1967-74[b].

State banded	June			July			August		
	1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-31
South Dakota	←39%→			←56%→			←66%→		
Missouri	←61%→						←82%→		
Kansas	←50%→								
Colorado	←40%→								
New Mexico	←42%→						←74%→		
Oklahoma	←43%→						←65%→		
Arkansas	←81%→						←96%→		←84%→
North Texas	←79%→								
South Texas	←80%→								

[a]Excludes WY data because of insufficient recoveries.
[b]Ten-day periods were pooled when P>0.05.

Table A-11. Direct recoveries by period of banding for mourning doves banded in the Central Management Unit, 1967-74.

Banding period	Recoveries		
	Immatures	Adults	Totals
June			
1-10	85 (2.7)	331 (15.7)	416 (7.9)
11-20	163 (5.2)	324 (15.4)	487 (9.2)
21-30	270 (8.5)	354 (16.8)	624 (11.8)
Subtotals	518 (16.4)	1,009 (47.8)	1,527 (29.0)
July			
1-10	319 (10.1)	257 (12.2)	576 (10.9)
11-20	369 (11.7)	247 (11.7)	616 (11.7)
21-31	555 (17.6)	235 (11.1)	790 (15.0)
Subtotals	1,243 (39.3)	739 (35.0)	1,982 (37.6)
August			
1-10	539 (17.0)	171 (8.1)	710 (13.5)
11-20	520 (16.4)	133 (6.3)	653 (12.4)
21-31	342 (10.8)	58 (2.7)	400 (7.6)
Subtotals	1,401 (44.3)	362 (17.2)	1,763 (33.4)
Totals	3,162(100.0)	2,110(100.0)	5,272(100.0)

Table A-12. Preseason mourning dove banding accomplishments in the U.S., 1967-75[a].

States	Immatures	Adult males	Adult females	All adults	All doves
Alabama	26,942	6,479	5,054	11,781	38,723
Arizona	12,595	4,809	3,930	8,786	21,381
Arkansas	7,584	2,823	1,567	4,526	12,110
California	22,394	4,702	3,075	8,007	30,401
Colorado	13,721	8,758	6,728	15,532	29,253
Connecticut	141	144	42	225	366
Delaware	137	74	44	118	255
Florida	24,306	2,778	1,875	4,920	29,226
Georgia	19,621	4,590	3,044	7,864	27,485
Idaho	1,580	827	536	1,397	2,977
Illinois	10,125	4,306	2,279	7,643	17,768
Indiana	18,833	4,321	1,963	6,403	25,236
Iowa	10,701	9,126	3,850	13,165	23,866
Kansas	8,967	7,601	5,183	12,922	21,889
Kentucky	5,132	1,249	550	2,134	7,266
Louisiana	26,926	4,677	2,889	7,848	34,774
Maine	0	1	2	10	10
Maryland	9,780	3,159	1,904	5,322	15,102
Massachusetts	18,524	3,262	2,217	5,671	24,195
Michigan	2,724	2,919	1,309	4,464	7,188
Minnesota	17,217	5,595	1,974	8,155	25,372
Mississippi	15,602	3,645	1,992	5,734	21,336
Missouri	13,666	4,522	2,682	7,300	20,966
Montana	10,125	1,723	1,055	2,970	13,095
Nebraska	12,216	9,446	4,473	14,211	26,427
Nevada	3,194	1,892	860	2,771	5,965
New Hampshire	101	18	6	169	270
New Jersey	3,760	2,915	1,750	4,816	8,576
New Mexico	15,887	6,467	3,710	10,358	26,245
New York	8,479	2,101	1,008	3,424	11,903
North Carolina	17,465	4,854	3,093	8,026	25,491
North Dakota	9,707	3,418	1,664	5,475	15,182
Ohio	15,052	8,947	3,283	12,630	27,682
Oklahoma	13,031	1,757	1,226	3,170	16,201
Oregon	2,837	613	423	1,201	4,038
Pennsylvania	9,446	3,673	2,225	6,138	15,584
Rhode Island	1,250	394	184	590	1,840
South Carolina	29,063	6,467	4,346	11,004	40,067
South Dakota	21,160	17,096	9,093	26,765	47,925
Tennessee	19,736	4,012	2,603	6,807	26,543
Texas	23,586	14,753	6,998	23,266	46,852
Utah	6,222	5,215	3,407	8,833	15,055
Vermont	6	10	1	14	20
Virginia	17,252	5,490	4,074	9,752	27,004
Washington	7,096	847	764	1,627	8,723
West Virginia	374	151	111	303	677
Wisconsin	9,174	2,813	1,115	4,122	13,296
Wyoming	4,407	1,703	536	2,524	6,931
Totals	547,844	197,142	112,697	320,893	868,737

[a]Those mourning doves in the CMU banded in 1967-74.

Table A-13. Preseason mourning dove bandings in the Central Management Unit by States, years, age, and sex, 1967-74.

States	Years	Immatures	Adult males	Adult females	All adults[a]	All doves
Montana	1968	897	140	102	243	1,140
	1969	33	9	3	12	45
	1970	1,684	119	48	176	1,860
	1971	2,356	193	95	437	2,793
	1972	1,972	343	262	612	2,584
	1973	1,332	395	159	560	1,892
	1974	1,851	524	386	930	2,781
	Totals	10,125	1,723	1,055	2,970	13,095
North Dakota	1967	269	150	96	374	643
	1968	209	187	52	240	449
	1969	278	127	54	304	582
	1970	2,103	326	159	505	2,608
	1971	1,685	787	342	1,175	2,860
	1972	2,111	769	347	1,181	3,292
	1973	1,001	371	195	567	1,568
	1974	2,051	701	419	1,129	3,180
	Totals	9,707	3,418	1,664	5,475	15,182
Minnesota	1967	1,246	651	283	957	2,203
	1968	862	583	134	725	1,587
	1969	1,833	567	108	804	2,637
	1970	2,725	634	315	1,185	3,910
	1971	3,465	1,325	461	1,870	5,335
	1972	2,978	870	317	1,242	4,220
	1973	2,263	740	305	1,078	3,341
	1974	1,845	225	51	294	2,139
	Totals	17,217	5,595	1,974	8,155	25,372
South Dakota	1967	5,745	4,075	1,982	6,138	11,883
	1968	2,200	1,506	1,015	2,558	4,758
	1969	3,360	2,109	1,238	3,426	6,786
	1970	2,176	1,992	1,157	3,183	5,359
	1971	2,530	2,243	1,088	3,460	5,990
	1972	2,162	1,847	985	2,944	5,106
	1973	1,669	1,539	749	2,329	3,998
	1974	1,318	1,785	879	2,727	4,045
	Totals	21,160	17,096	9,093	26,765	47,925
Wyoming	1969	143	65	41	106	249
	1970	362	209	85	299	661
	1971	1,299	437	60	575	1,874
	1972	1,128	200	131	355	1,483
	1973	416	248	42	394	810
	1974	1,059	544	177	795	1,854
	Totals	4,407	1,703	536	2,524	6,931

Table A-13. Preseason mourning dove bandings in the Central Management Unit by States, years, age, and sex, 1967-74 (Continued).

States	Years	Immatures	Adult males	Adult females	All adults[a]	All doves
Nebraska	1967	653	833	384	1,268	1,921
	1968	839	589	234	859	1,698
	1969	1,294	1,398	573	1,994	3,288
	1970	2,566	1,402	517	1,936	4,502
	1971	2,000	1,632	923	2,608	4,608
	1972	1,005	1,117	519	1,710	2,715
	1973	2,566	1,587	775	2,396	4,962
	1974	1,293	888	548	1,440	2,733
	Totals	12,216	9,446	4,473	14,211	26,427
Iowa	1967	1,457	1,416	597	2,014	3,471
	1968	1,020	924	372	1,324	2,344
	1969	1,179	1,187	493	1,704	2,883
	1970	1,496	993	363	1,368	2,864
	1971	1,624	1,289	548	1,868	3,492
	1972	1,554	1,142	528	1,707	3,261
	1973	1,190	935	416	1,366	2,556
	1974	1,181	1,240	533	1,814	2,995
	Totals	10,701	9,126	3,850	13,165	23,866
Missouri	1967	2,028	723	305	1,063	3,091
	1968	1,275	424	215	645	1,920
	1969	1,046	692	627	1,327	2,373
	1970	1,942	581	215	803	2,745
	1971	2,288	700	347	1,058	3,346
	1972	2,627	641	414	1,083	3,710
	1973	854	494	368	862	1,716
	1974	1,606	267	191	459	2,065
	Totals	13,666	4,522	2,682	7,300	20,966
Kansas	1967	515	461	238	712	1,227
	1968	172	233	113	348	520
	1969	977	864	547	1,411	2,388
	1970	1,027	928	548	1,515	2,542
	1971	1,014	1,580	1,372	2,978	3,992
	1972	2,384	1,126	620	1,767	4,151
	1973	1,204	1,156	900	2,077	3,281
	1974	1,674	1,253	845	2,114	3,788
	Totals	8,967	7,601	5,183	12,922	21,889

Table A-13. Preseason mourning dove bandings in the Central Management Unit by States, years, age, and sex, 1967-74 (Continued).

States	Years	Immatures	Adult males	Adult females	All adults[a]	All doves
Colorado	1967	1,177	616	364	988	2,165
	1968	1,512	481	480	972	2,484
	1969	1,089	1,360	888	2,255	3,344
	1970	1,380	773	656	1,432	2,812
	1971	2,355	1,536	1,168	2,712	5,067
	1972	2,357	1,244	958	2,203	4,560
	1973	1,822	1,341	1,150	2,493	4,315
	1974	2,029	1,407	1,064	2,477	4,506
	Totals	13,721	8,758	6,728	15,532	29,253
New Mexico	1967	1,882	325	127	458	2,340
	1968	1,739	492	73	567	2,306
	1969	2,920	351	78	429	3,349
	1970	2,937	703	383	1,091	4,028
	1971	681	1,816	642	2,529	3,210
	1972	2,639	1,142	962	2,170	4,809
	1973	1,778	685	583	1,285	3,063
	1974	1,311	953	862	1,829	3,140
	Totals	15,887	6,467	3,710	10,358	26,245
Oklahoma	1967	165	11	7	18	183
	1968	1,779	256	177	461	2,240
	1969	2,100	375	177	567	2,667
	1970	3,075	486	349	860	3,935
	1971	1,555	176	111	289	1,844
	1972	3,540	200	235	437	3,977
	1973	98	77	27	104	202
	1974	719	176	143	434	1,153
	Totals	13,031	1,757	1,226	3,170	16,201
Arkansas	1967	429	88	32	121	550
	1968	283	183	80	272	555
	1969	616	189	129	319	935
	1970	1,376	552	327	904	2,280
	1971	1,376	426	253	696	2,072
	1972	1,409	511	252	806	2,215
	1973	739	432	216	659	1,398
	1974	1,356	442	278	749	2,105
	Totals	7,584	2,823	1,567	4,526	12,110

Table A-13. Preseason mourning dove bandings in the Central Management Unit by States, years, age, and sex, 1967-74 (Continued).

States	Years	Immatures	Adult males	Adult females	All adults[a]	All doves
North Texas	1967	85	53	6	63	148
	1968	1,416	662	234	917	2,333
	1969	3,224	1,933	1,058	3,175	6,399
	1970	3,191	1,808	1,036	3,041	6,232
	1971	1,810	1,272	644	1,985	3,795
	1972	3,402	1,215	524	1,861	5,263
	1973	1,683	2,527	1,058	3,710	5,393
	1974	1,973	1,509	693	2,343	4,316
	Totals	16,784	10,979	5,253	17,095	33,879
South Texas	1967	126	0	2	16	142
	1968	855	168	45	214	1,069
	1969	490	409	301	863	1,353
	1970	1,136	192	111	406	1,542
	1971	605	399	230	710	1,315
	1972	957	609	241	930	1,887
	1973	1,268	1,331	520	2,003	3,271
	1974	1,365	666	295	1,029	2,394
	Totals	6,802	3,774	1,745	6,171	12,973
Texas[b]	1967	211	53	8	79	290
	1968	2,271	830	279	1,131	3,402
	1969	3,714	2,342	1,359	4,038	7,752
	1970	4,327	2,000	1,147	3,447	7,774
	1971	2,415	1,671	874	2,695	5,110
	1972	4,359	1,824	765	2,791	7,150
	1973	2,951	3,858	1,578	5,713	8,664
	1974	3,338	2,175	988	3,372	6,710
	Totals	23,586	14,753	6,998	23,266	46,852
Central Management Unit	1967	15,777	9,402	4,423	14,190	29,967
	1968	15,058	6,828	3,326	10,345	25,403
	1969	20,582	11,635	6,315	18,696	39,278
	1970	29,176	11,698	6,269	18,704	47,880
	1971	26,643	15,811	8,284	24,950	51,593
	1972	32,225	12,976	7,295	21,008	53,233
	1973	19,883	13,858	7,463	21,883	41,766
	1974	22,631	12,580	7,364	20,563	43,194
	Totals	181,975	94,788	50,739	150,339	332,314

[a]Includes unknown sex adults.
[b]Total TX bandings are not included in the CMU total to avoid duplication of N.TX and S.TX totals.

Table A-14. Distribution of direct recoveries of immature mourning doves banded preseason in the Central Management Unit, expressed as numbers of recoveries, 1967-74.

Area recovered[a]	Area banded MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)[b]	Totals
CMU																	
South Dakota		4	2	216													222
Wyoming					4												4
Nebraska																	
Missouri				1				334					3				338
Kansas		1	1	6		2	4	9	71	1			1				96
Colorado	20	2		3	4	2	2			56	1	1					91
New Mexico	10	3	1	9	4	4	1		1	10	75	1		1		(1)	120
Oklahoma	1	3	5	4		1	1	5	4	2		139	7				172
Arkansas			1				1	2					275				279
North Texas	3	16	27	32	3	13	19	9	24	9	10	61	6	356	23	(379)	611
South Texas	2	12	44	37		12	29	18	12	1	1	7	4	42	160	(202)	381
(Texas)[b]	(5)	(28)	(71)	(69)	(3)	(25)	(48)	(28)	(36)	(10)	(11)	(68)	(10)	(399)	(186)	(585)	(997)
Subtotals	36	41	81	308	15	34	57	378	112	79	87	209	296	400	186	(586)	2,319
EMU																	
Illinois					1		2	16		1							20
Maryland								1									1
Kentucky								2									2
Tennessee								1									1
North Carolina																	
South Carolina			2				3	5									10
Georgia			6				5	8					2				21
Alabama		2	7	1		1	5	8					3		1	(1)	28
Mississippi			6	1		1		5					1		1	(1)	15
Louisiana		4	24	9		1	13	20				1	9	1	5	(6)	87
Florida		1	11	5			11	26					2				56
Subtotals		7	56	16	1	3	39	92		1		1	17	1	7	(8)	241
WMU																	
Oregon																	
Idaho	2																2
Utah	2																2
Nevada																	
California	7		3		1			1		4							16
Arizona	3	2	1	3	2					5							16
Subtotals	14	2	4	3	3			1		9							36
MEXICO																	
NW Coast	2	1	4	3	4	1				6	5	3		2		(2)	31
N. Highlands			3	1				1		3	2						10
NE Coast			1	1				1		1				1		(1)	5
W. Highlands	35	22	43	72	9	46	10	9	20	38	36	29	4	38	6	(44)	417
C. Highlands		4	1	3		2		1	1	2		5		4	3	(7)	26
South		1	2	2		1		1				2		2		(2)	11
Yucatan Pen.																	
Unknown	1			2			2	1	1		1	3					11
Subtotals	38	28	54	84	13	50	12	14	22	50	44	42	4	47	9	(56)	511
CENTRAL AMERICA																	
Guatemala		4	2	1			2		3	1	1	2	2	3	1	(4)	22
El Salvador		2	3	3		1	2	1	3			1			1	(1)	17
Honduras		1	1				1		1					2		(2)	6
Nicaragua		2	1	1			1		2								7
Costa Rica												1					1
Subtotals		9	7	5		1	6	1	9	1	1	4	2	5	2	(7)	53
Totals	88	87	202	416	32	88	114	486	143	140	132	256	319	453	204	(657)	3,160
Total banded	10,125	9,707	17,217	21,160	4,407	12,216	10,701	13,666	8,967	13,721	15,887	13,031	7,584	16,784	6,802	(23,586)	181,975
Recovery rate	0.87	0.90	1.17	1.97	0.73	0.72	1.06	3.56	1.59	1.02	0.83	1.96	4.21	2.70	3.00	(2.79)	1.74

[a] States without hunting seasons excluded.
[b] Includes dove recoveries from unknown locations in TX.

Table A-15. Distribution of direct recoveries of adult male mourning doves banded preseason in the Central Management Unit, expressed as numbers of recoveries, 1967-74.

Area recovered[a]	Area banded MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)[b]	Totals
CMU																	
South Dakota			1	250													251
Wyoming																	
Nebraska							1	104	1				1				107
Missouri				2				1	103						1	(1)	107
Kansas	1			1		1				56							59
Colorado				2	1				1	8	43						55
New Mexico		1		1			2	1	1			23	1	2		(2)	32
Oklahoma							2						51				53
Arkansas		9	13	30		12	14	2	8	7	4	2	4	253	2	(255)	360
North Texas	1	7	13	22		16	15	3	13	1		4	1	13	76	(89)	185
South Texas	(1)	(16)	(26)	(52)		(28)	(29)	(5)	(21)	(8)	(4)	(6)	(5)	(266)	(78)	(344)	(545)
(Texas)[b]	2	17	27	308	1	29	34	111	127	72	47	29	58	268	79	(347)	1,209
Subtotals																	
EMU							1										1
Illinois																	
Maryland				1													1
Kentucky													1				1
Tennessee																	
North Carolina																	
South Carolina							1	1									2
Georgia							3	1					1				5
Alabama			2	1			1										4
Mississippi			3				8					1					12
Louisiana			2				2										4
Florida			7	2			16	2				1	2				30
Subtotals																	
WMU																	
Oregon																	
Idaho																	
Utah																	
Nevada																	
California																	
Arizona	2									3				1		(1)	6
Subtotals	2									3				1		(1)	6
MEXICO																	
NW Coast	1	1		3		1			2	1	1						10
N. Highlands				1		1					1			1		(1)	4
NE Coast		1		1		1											3
W. Highlands	1		9	17	4	12	8	1	9	10	2			6	1	(7)	80
C. Highlands			2	2		3	1		1								9
South				1		1	3	1	1								7
Yucatan Pen.																	
Unknown				1													1
Subtotals	2	2	11	26	4	19	12	2	13	11	4			7	1	(8)	114
CENTRAL AMERICA																	
Guatemala	1	1	1	3		2	2		2								12
El Salvador				1		2	1			1				1		(1)	6
Honduras			1	2													3
Nicaragua		1		1		1			2								5
Costa Rica				1													1
Subtotals	1	2	2	8		5	3		4	1				1		(1)	27
Totals	7	21	47	344	5	53	65	115	144	87	51	30	60	277	80	(357)	1,386
Total banded	1,723	3,418	5,595	17,096	1,703	9,446	9,126	4,522	7,601	8,758	6,467	1,757	2,823	10,979	3,774	(14,753)	94,788
Recovery rate	0.41	0.61	0.84	2.01	0.29	0.56	0.71	2.54	1.89	0.99	0.79	1.71	2.13	2.52	2.12	(2.42)	1.46

[a] States without hunting seasons excluded.
[b] Includes dove recoveries from unknown locations in TX.

Table A-16. Distribution of direct recoveries of adult female mourning doves banded preseason in the Central Management Unit, expressed as numbers of recoveries, 1967-74.

Area recovered[a]	Area banded MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)[b]	Totals
CMU																	
South Dakota				90						1							91
Wyoming																	
Nebraska								47					1				50
Missouri		2						1	69								73
Kansas		1		2					1	34							36
Colorado				1						4	11						20
New Mexico		1		4					1			10	1				15
Oklahoma			2	1				2					35				37
Arkansas						10	7	2	6	1	1	5	2	78	1	(79)	134
North Texas		4	4	13		7	4	1	7			2	1	2	33	(35)	81
South Texas		1	4	19		(17)	(11)	(3)	(13)	(1)	(1)	(7)	(3)	(80)	(34)	(114)	(215)
(Texas)[b]		(5)	(8)	(32)		17	11	53	84	40	12	17	40	80	34	(114)	537
Subtotals		9	10	130													
EMU								1									1
Illinois																	
Maryland								1									1
Kentucky																	
Tennessee							1	1									2
North Carolina								2									3
South Carolina							1	1									1
Georgia								2									9
Alabama							3	1					1				2
Mississippi			4					2									19
Louisiana							5	9					1				
Florida			4														
Subtotals																	
WMU																	
Oregon																	
Idaho																	
Utah																	
Nevada																	5
California				1	1					3							5
Arizona				1	1					3							
Subtotals																	4
MEXICO										1	1						2
NW Coast				2		1					1			1		(1)	1
N. Highlands														6		(6)	49
NE Coast									5	9	3	5					7
W. Highlands	2	3	2	6	1	5	2			2	1						
C. Highlands			1			1	2										
South														1		(1)	3
Yucatan Pen.										1				8		(8)	66
Unknown				1						13	6	5					
Subtotals	2	3	3	9	1	7	4		5								9
CENTRAL AMERICA														1		(1)	5
Guatemala			1			2	3	3						1		(1)	2
El Salvador				2		2											
Honduras				1													
Nicaragua														2		(2)	16
Costa Rica														90	34	(124)	643
Subtotals			1	3		4	3	3									
Totals	2	12	18	143	2	28	23	65	89	56	18	22	41				
Total banded	1,055	1,664	1,974	9,093	536	4,473	3,850	2,682	5,183	6,728	3,710	1,226	1,567	5,253	1,745	(6,998)	50,739
Recovery rate	0.19	0.72	0.91	1.57	0.37	0.63	0.60	2.42	1.72	0.83	0.49	1.79	2.62	1.71	1.95	(1.77)	1.27

[a] States without hunting seasons excluded.
[b] Includes dove recoveries from unknown locations in TX.

Table A-17. Distribution of direct recoveries of adult mourning doves banded preseason in the Central Management Unit, expressed as numbers of recoveries, 1967-74.

Area recovered[a]	Area banded MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)[b]	Totals
CMU																	
South Dakota			1	348						1							350
Wyoming																	
Nebraska							1	151	1				2				157
Missouri		2						2	174			1			1	(1)	183
Kansas		1		4													95
Colorado	1			2		1			1	90							76
New Mexico		1		6	1				1	12	55						54
Oklahoma		1	2	2			2	1	2			40	2	2		(2)	92
Arkansas							2	2					88				516
North Texas		13	17	45		23	21	4	14	8	5	7	6	350	3	(353)	291
South Texas	1	8	18	42		24	20	5	21	1		6	2	16	127	(143)	(808)
(Texas)[b]	(1)	(21)	(35)	(87)		(47)	(41)	(9)	(35)	(9)	(5)	(13)	(8)	(366)	(131)	(497)	1,815
Subtotals	2	26	38	449	1	48	46	165	214	112	60	54	100	368	132	(500)	
EMU																	2
Illinois							1	1									
Maryland																	1
Kentucky				1									1				2
Tennessee								1									
North Carolina																	
South Carolina							2	2									5
Georgia			1				4	3					1				8
Alabama							1	1									5
Mississippi			2	1			11	2				1					21
Louisiana			7				2	1					1				7
Florida			3				21	11				1	3				51
Subtotals			13	2													
WMU																	
Oregon																	
Idaho																	
Utah																	
Nevada																	1
California				1						6				1		(1)	11
Arizona	2			1	1					6				1		(1)	12
Subtotals	2			2	1												
MEXICO																	15
NW Coast	1	1		5		1			3	2	2			1		(1)	6
N. Highlands				1		2					2			1		(1)	4
NE Coast		1		1		1								12	1	(13)	130
W. Highlands	3	3	11	25	5	17	11	1	12	19	5	5					18
C. Highlands			4	2		4	3		2	2	1						7
South				1		1	3	1	1								
Yucatan Pen.										1				1		(1)	4
Unknown				2										15	1	(16)	184
Subtotals	4	5	15	37	5	26	17	2	18	24	10	5					
CENTRAL AMERICA																	21
Guatemala	1	1	2	3		4	5	3	2					2		(2)	12
El Salvador		1		3		4	1			1				1		(1)	5
Honduras			1	3													5
Nicaragua		1		1		1			2								1
Costa Rica				1										3		(3)	44
Subtotals	1	3	3	11		9	6	3	4	1							
Totals	9	34	69	501	7	83	90	181	236	143	70	60	103	387	133	(520)	2,106
Total banded	2,970	5,475	8,155	26,765	2,524	14,211	13,165	7,300	12,922	15,532	10,358	3,170	4,526	17,095	6,171	(23,266)	150,339
Recovery rate	0.30	0.62	0.85	1.87	0.28	0.58	0.68	2.48	1.83	0.92	0.68	1.89	2.28	2.26	2.16	(2.24)	1.40

[a]States without hunting seasons excluded.
[b]Includes dove recoveries from unknown locations in TX.

Table A-18. Distribution of direct recoveries of all mourning doves banded preseason in the Central Management Unit, expressed as numbers of recoveries, 1967-74.

Area recovered[a]	Area banded																
	MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)[b]	Totals
CMU																	
South Dakota		4	3	564						1							572
Wyoming					4												4
Nebraska																	
Missouri		2		1			1	485	1				5				495
Kansas		2	1	10		2	4	11	245	1		1	1		1	(1)	279
Colorado	21	2		5	4	3	2		1	146	1	1					186
New Mexico	10	4	1	15	5	4	1		2	22	130	1		1		(1)	196
Oklahoma	1	4	7	6		1	3	6	6	2		179	9	2		(2)	226
Arkansas			1				3	4					363				371
North Texas	3	29	44	77	3	36	40	13	38	17	15	68	12	706	26	(732)	1,127
South Texas	3	20	62	79		36	49	23	33	2	1	13	6	58	287	(345)	672
(Texas)[b]	(6)	(49)	(106)	(156)	(3)	(72)	(89)	(37)	(71)	(19)	(16)	(81)	(18)	(765)	(317)	(1,082)	(1,805)
Subtotals	38	67	119	757	16	82	103	543	326	191	147	263	396	768	318	(1,086)	4,134
EMU																	
Illinois					1		3	17		1							22
Maryland								1									1
Kentucky				1				2									3
Tennessee								2					1				3
North Carolina																	
South Carolina			2				3	5									10
Georgia			7				7	10					2				26
Alabama		2	7	1		1	9	11					4		1	(1)	36
Mississippi			8	2		1	1	6					1		1	(1)	20
Louisiana		4	31	9		1	24	22				2	9	1	5	(6)	108
Florida		1	14	5			13	27					3				63
Subtotals		7	69	18	1	3	60	103		1		2	20	1	7	(8)	292
WMU																	
Oregon																	
Idaho	2																2
Utah	2																2
Nevada																	
California	7		3	1	1			1		4							17
Arizona	5	2	1	4	3					11				1		(1)	27
Subtotals	16	2	4	5	4			1		15				1		(1)	48
MEXICO																	
NW Coast	3	2	4	8	4	2			3	8	7	3		2		(2)	46
N. Highlands			3	2		2		1		3	4			1		(1)	16
NE Coast		1	1	2		1		1		1				2		(2)	9
W. Highlands	38	25	54	97	14	63	21	10	32	57	41	34	4	50	7	(57)	547
C. Highlands		4	5	5		6	3	1	3	4	1	5		4	3	(7)	44
South		1	2	3		2	3	2	1			2		2		(2)	18
Yucatan Pen.																	
Unknown	1			4			2	1	1	1	1	3		1		(1)	15
Subtotals	42	33	69	121	18	76	29	16	40	74	54	47	4	62	10	(72)	695
CENTRAL AMERICA																	
Guatemala	1	5	4	4		4	7	3	5	1	1	2	2	3	1	(4)	43
El Salvador		3	3	6		5	3	1	3	1		1		2	1	(3)	29
Honduras		1	2	3			1		1					3		(3)	11
Nicaragua		3	1	2		1	1		4								12
Costa Rica				1								1					2
Subtotals	1	12	10	16		10	12	4	13	2	1	4	2	8	2	(10)	97
Totals	97	121	271	917	39	171	204	667	379	283	202	316	422	840	337	(1,177)	5,266
Total banded	13,095	15,182	25,372	47,925	6,931	26,427	23,866	20,966	21,889	29,253	26,245	16,201	12,110	33,879	12,973	(46,852)	332,314
Recovery rate	0.74	0.80	1.07	1.91	0.56	0.65	0.85	3.18	1.73	0.97	0.77	1.95	3.48	2.48	2.60	(2.51)	1.58

[a] States without hunting seasons excluded.
[b] Includes dove recoveries from unknown locations in TX.

Table A-19. Distribution of indirect recoveries of immature mourning doves banded preseason in the Central Management Unit, expressed as numbers of recoveries, 1967-74.

Area recovered[a]	Area banded																
	MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)[b]	Totals
CMU																	
South Dakota		1	1	122										1		(1)	125
Wyoming					2									1		(1)	3
Nebraska				1		63								1		(1)	65
Missouri			1				4	94	1	1		1	2	1		(1)	105
Kansas		3	1	3		6		2	67			6		1		(1)	89
Colorado	9	1		1	1	3				54	1			1		(1)	71
New Mexico	5	1	1	2	3	6			1	6	63	1		1		(1)	90
Oklahoma		3	1	4		1	3	1	1			51	2	4	1	(5)	72
Arkansas								2				2	57	1	1	(2)	63
North Texas	9	15	14	47	2	25	14	5	15	10	17	49	3	180	8	(188)	413
South Texas (Texas)[b]	2 (11)	18 (33)	23 (37)	32 (79)	(2)	12 (37)	27 (41)	6 (11)	11 (26)	1 (11)	2 (19)	20 (70)	(4)	19 (200)	91 (101)	(110) (301)	264 (682)
Subtotals	25	42	42	212	8	116	48	110	96	72	83	131	65	212	103	(315)	1,365
EMU																	
Illinois							3	7									10
Maryland																	
Kentucky	1		1			1		1									4
Tennessee							1										1
North Carolina								1									1
South Carolina		1											1				2
Georgia			3				1	3					1				8
Alabama			4	1			3	3					1				12
Mississippi								3					3				6
Louisiana			3	1			3	4				2	1	2	3	(5)	19
Florida			3				2	2					1				8
Subtotals	1	1	14	2		1	13	24				2	8	2	3	(5)	71
WMU																	
Oregon										1							1
Idaho											1						1
Utah	1									2	1						4
Nevada	2										2						4
California	6			1	1	1	1	1		5	9			1		(1)	26
Arizona	4			1	5	1		1		5	12						29
Subtotals	13			2	6	2	1	2		13	25			1		(1)	65
MEXICO																	
NW Coast	2	3				2			2	3	4	2		1		(1)	19
N. Highlands	4	1	1	2		4		1	1		2			1		(1)	17
NE Coast			1	2					2	1		3			1	(1)	10
W. Highlands	19	25	35	49	7	35	10	5	12	21	22	20		18	3	(21)	281
C. Highlands	1	5	6	3		3	3			1	4	2		2		(2)	30
South Yucatan Pen.			2			1			1		1	2					7
Unknown	1	3	1	4		5	1		2	7	3	3		4		(4)	34
Subtotals	27	37	46	60	7	50	14	6	20	33	36	32		26	4	(30)	398
CENTRAL AMERICA																	
Guatemala	1	2	2	4		4	3		1		2	1	1				21
El Salvador				5		2	3	1	4	1		4		1		(1)	21
Honduras		2	2	5			1					1					11
Nicaragua		2		1		1						1					5
Costa Rica			1	1													2
Subtotals	1	6	5	16		7	7	1	5	1	2	7	1	1		(1)	60
Totals	67	86	107	292	21	176	83	143	121	119	146	172	74	242	110	(352)	1,959
Total banded	10,125	9,707	17,217	21,160	4,407	12,216	10,701	13,666	8,967	13,721	15,887	13,031	7,584	16,784	6,802	(23,586)	181,975
Recovery rate	0.66	0.89	0.62	1.38	0.48	1.44	0.78	1.05	1.35	0.87	0.92	1.32	0.98	1.44	1.62	(1.49)	1.08

[a] States without hunting seasons excluded.
[b] Includes dove recoveries from unknown locations in TX.

Table A-20. Distribution of indirect recoveries of adult male mourning doves banded preseason in the Central Management Unit, expressed as numbers of recoveries, 1967-74.

Area recovered[a]	Area banded MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)[b]	Totals
CMU																	
South Dakota				157		1											158
Wyoming					2												2
Nebraska				3		45											48
Missouri			1	1			2	79									83
Kansas		1	1			1		1	80					1		(1)	85
Colorado	1				1	1				46	2			1		(1)	52
New Mexico		1		6		4			1	11	30			1		(1)	54
Oklahoma		2		5		1	2	1	1			11		2	1	(3)	26
Arkansas			1										17				18
North Texas	2	6	5	43	2	23	14	4	16	6	3	4		139	3	(142)	270
South Texas		8	7	26		14	18	3	5	3		3		5	78	(83)	170
(Texas)[b]	(2)	(15)	(12)	(69)	(2)	(37)	(32)	(7)	(21)	(9)	(3)	(7)		(146)	(81)	(227)	(443)
Subtotals	3	19	15	241	5	90	36	88	103	66	35	18	17	151	82	(233)	969
EMU																	
Illinois							2	3									5
Maryland																	
Kentucky																	
Tennessee																	
North Carolina							1										1
South Carolina																	
Georgia			1				2										3
Alabama							2			1							3
Mississippi																	
Louisiana			1				2						3	1		(1)	7
Florida			4				1										5
Subtotals			6				10	3		1			3	1		(1)	24
WMU																	
Oregon											1						1
Idaho				1													1
Utah										1							1
Nevada																	
California																	
Arizona	2			2	1						2						7
Subtotals	2			3	1					1	3						10
MEXICO																	
NW Coast	3	1		5		4	2	1		3	5			2		(2)	26
N. Highlands				3		1					1			1		(1)	6
NE Coast			2	2					2			1					7
W. Highlands	2	9	5	30	4	20	9	1	10	6	2	4	1	6		(6)	109
C. Highlands		2	3	5			5	2	1					1		(1)	19
South			3				1		1								5
Yucatan Pen.																	
Unknown				3			1			1				1		(1)	6
Subtotals	5	12	13	48	4	25	18	4	14	10	8	5	1	11		(11)	178
CENTRAL AMERICA																	
Guatemala		2	1	1		2	2		1								9
El Salvador			2	2		3	1						1		2	(2)	11
Honduras	2					3		1									6
Nicaragua				1													1
Costa Rica																	
Subtotals	2	2	3	4		8	3	1	1				1		2	(2)	27
Totals	12	33	37	296	10	123	67	96	118	78	46	23	22	163	84	(247)	1,208
Total banded	1,723	3,418	5,595	17,096	1,703	9,446	9,126	4,522	7,601	8,758	6,467	1,757	2,823	10,979	3,774	(14,753)	94,788
Recovery rate	0.70	0.97	0.66	1.73	0.59	1.30	0.73	2.12	1.55	0.89	0.71	1.30	0.78	1.48	2.23	(1.67)	1.27

[a]States without hunting seasons excluded.
[b]Includes dove recoveries from unknown locations in TX.

Table A-21. Distribution of indirect recoveries of adult female mourning doves banded preseason in the Central Management Unit, expressed as numbers of recoveries, 1967-74.

Area recovered[a]	Area banded MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)[b]	Totals
CMU																	76
South Dakota				75						1							1
Wyoming					1												19
Nebraska						19											21
Missouri			1				1	19						1		(1)	46
Kansas		1							44								40
Colorado	1			2		1				35	1						22
New Mexico				2						4	16						10
Oklahoma						1		1	2			6					15
Arkansas							1	1					13				122
North Texas	1	3	9	20		4	6		6	4	3	4	2	59	1	(60)	67
South Texas		2	6	13		5	10	1	3	2		1	1	2	21	(23)	(189)
(Texas)[b]	(1)	(5)	(15)	(33)		(9)	(16)	(1)	(9)	(6)	(3)	(5)	(3)	(61)	(22)	(83)	439
Subtotals	2	6	16	112	1	30	18	22	55	46	20	11	16	62	22	(84)	
EMU																	1
Illinois				1													
Maryland																	
Kentucky																	
Tennessee																	
North Carolina																	1
South Carolina			1												1	(1)	4
Georgia			1				2										
Alabama													1	1		(1)	5
Mississippi							2	1									
Louisiana													1	1	1	(2)	11
Florida			2	1			4	1									
Subtotals																	
WMU																	1
Oregon	1																
Idaho																	
Utah																	
Nevada										2	1						4
California	1									2	1						5
Arizona	2																
Subtotals																	
MEXICO				3		1				4	1						9
NW Coast				3						1	2						7
N. Highlands			1					1									1
NE Coast								1									
W. Highlands	1	3	3	19	1	9	5	1	12	11		2		5	2	(7)	74
C. Highlands				3		1			1	1				1		(1)	7
South				1			1										2
Yucatan Pen.											1	1		1		(1)	8
Unknown	1			2		1	1										
Subtotals	2	3	4	31	1	12	7	2	13	17	4	3		7	2	(9)	108
CENTRAL AMERICA																	12
Guatemala			2	3	1	1	3		2					1		(1)	5
El Salvador				3				1									
Honduras						1	1			1							3
Nicaragua																	
Costa Rica										1				1		(1)	20
Subtotals			2	6	1	2	4	1	2								
Totals	6	9	24	150	3	44	33	26	70	66	25	14	17	71	25	(96)	583
Total banded	1,055	1,664	1,974	9,093	536	4,473	3,850	2,682	5,183	6,728	3,710	1,226	1,567	5,253	1,745	(6,998)	50,739
Recovery rate	0.57	0.54	1.22	1.65	0.56	0.98	0.86	0.97	1.35	0.98	0.67	1.14	1.08	1.35	1.43	(1.37)	1.15

[a]States without hunting seasons excluded.
[b]Includes dove recoveries from unknown locations in TX.

Table A-22. Distribution of indirect recoveries of adult mourning doves banded preseason in the Central Management Unit, expressed as numbers of recoveries, 1967-74.

Area recovered[a]	Area banded MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)[b]	Totals
CMU																	
South Dakota				236		1				1							238
Wyoming					3												3
Nebraska				3		64								1		(1)	68
Missouri			2	1			3	99									105
Kansas		2	1			1		1	125					2		(2)	132
Colorado	2			2	1	2				81	3			1		(1)	92
New Mexico		1		8		4			1	15	49			2		(2)	80
Oklahoma		2		5		2	2	2	3			18		3	1	(4)	38
Arkansas			2				1	1					31				35
North Texas	3	10	15	65	3	28	21	4	22	10	6	8	3	204	4	(208)	406
South Texas		10	13	41		19	28	4	8	5		4	1	7	109	(116)	249
(Texas)[b]	(3)	(21)	(28)	(106)	(3)	(47)	(49)	(8)	(30)	(15)	(6)	(12)	(4)	(213)	(113)	(326)	(658)
Subtotals	5	26	33	361	7	121	55	111	159	112	58	30	35	222	114	(336)	1,449
EMU																	
Illinois							2	3									5
Maryland				1													1
Kentucky																	
Tennessee																	
North Carolina							1										1
South Carolina																	
Georgia			2				2										4
Alabama			1				4			1					1	(1)	7
Mississippi																	
Louisiana			1				4	1					4	2		(2)	12
Florida			4				1										5
Subtotals			8	1			14	4		1			4	2	1	(3)	35
WMU																	
Oregon		1									1						2
Idaho	1			1													2
Utah										1							1
Nevada																	
California																	
Arizona	3			2	1					2	3						11
Subtotals	4	1		3	1					3	4						16
MEXICO																	
NW Coast	4	1		8	1	5	2	1		7	6			2		(2)	37
N. Highlands			1	6		1				1	3			1		(1)	13
NE Coast			2	2				1	2			1			1	(1)	9
W. Highlands	4	12	10	50	4	29	14	2	22	17	2	6	1	12	2	(14)	187
C. Highlands		2	3	8		1	5	2	2	1				2		(2)	26
South			4	1			2		1								8
Yucatan Pen.																	
Unknown	1	1		5		1	2			1	1	1		2		(2)	15
Subtotals	9	16	20	80	5	37	25	6	27	27	12	8	1	19	3	(22)	295
CENTRAL AMERICA																	
Guatemala		2	3	4	1	3	5		3								21
El Salvador			2	5		3	1	1					1	1	2	(3)	16
Honduras	2					3		1									6
Nicaragua				1		1	1			1							4
Costa Rica																	
Subtotals	2	2	5	10	1	10	7	2	3	1			1	1	2	(3)	47
Totals	20	45	66	455	14	168	101	123	189	144	74	38	41	244	120	(364)	1,842
Total banded	2,970	5,475	8,155	26,765	2,524	14,211	13,165	7,300	12,922	15,532	10,358	3,170	4,526	17,095	6,171	(23,266)	150,339
Recovery rate	0.67	0.82	0.81	1.70	0.55	1.18	0.77	1.68	1.46	0.93	0.71	1.20	0.91	1.43	1.94	(1.56)	1.22

[a]States without hunting seasons excluded.
[b]Includes dove recoveries from unknown locations in TX.

Table A-23. Distribution of indirect recoveries of all mourning doves banded preseason in the Central Management Unit, expressed as numbers of recoveries, 1967-74.

Area recovered[a]	Area banded															
	MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)[b]	Totals
CMU																	
South Dakota		1	1	358		1				1				1		(1)	363
Wyoming					5									1		(1)	6
Nebraska				4		127								2		(2)	133
Missouri			3	1			7	193	1	1		1	2	1		(1)	210
Kansas		5	2	3		7		3	192			6		3		(3)	221
Colorado	11	1		3	2	5				135	4			2		(2)	163
New Mexico	5	2	1	10	3	10			2	21	112	1		3		(3)	170
Oklahoma		5	1	9		3	5	3	4			69	2	7	2	(9)	110
Arkansas			2				1	3				2	88	1	1	(2)	98
North Texas	12	25	29	112	5	53	35	9	37	20	23	57	6	384	12	(396)	819
South Texas	2	28	36	73		31	55	10	19	6	2	24	1	26	200	(226)	513
(Texas)[b]	(14)	(54)	(65)	(185)	(5)	(84)	(90)	(19)	(56)	(26)	(25)	(82)	(8)	(413)	(214)	(627)	(1,340)
Subtotals	30	68	75	573	15	237	103	221	255	184	141	161	100	434	217	(651)	2,814
EMU																	
Illinois							5	10									15
Maryland				1													1
Kentucky	1		1			1		1									4
Tennessee							1										1
North Carolina							1	1									2
South Carolina		1											1				2
Georgia			5				3	3					1				12
Alabama			5	1			7	3		1			1		1	(1)	19
Mississippi								3					3				6
Louisiana			4	1			7	5				2	5	4	3	(7)	31
Florida			7				3	2					1				13
Subtotals	1	1	22	3		1	27	28		1		2	12	4	4	(8)	106
WMU																	
Oregon		1								1	1						3
Idaho	1			1							1						3
Utah	1									3	1						5
Nevada	2										2						4
California	6			1	1	1	1	1		5	9			1		(1)	26
Arizona	7			3	6	1		1		7	15						40
Subtotals	17	1		5	7	2	1	2		16	29			1		(1)	81
MEXICO																	
NW Coast	6	4		8	1	7	2	1	2	10	10	2		3	1	(4)	57
N. Highlands	4	1	2	8		5		1	1	1	5			2		(2)	30
NE Coast			3	4				1	4	1		4			1	(1)	18
W. Highlands	23	37	45	99	11	64	24	7	34	38	24	26	1	30	5	(35)	468
C. Highlands	1	7	9	11		4	8	2	2	2	4	2		4		(4)	56
South			6	1		1	2		2		1	2					15
Yucatan Pen.																	
Unknown	2	4	1	9		6	3		2	8	4	4		6		(6)	49
Subtotals	36	53	66	140	12	87	39	12	47	60	48	40	1	45	7	(52)	693
CENTRAL AMERICA																	
Guatemala	1	4	5	8	1	7	8		4		2	1	1				42
El Salvador			2	10		5	4	2	4	1		4	1	2	2	(4)	37
Honduras	2	2	2	5		3	1	1				1					17
Nicaragua		2		2		2	1			1		1					9
Costa Rica			1	1													2
Subtotals	3	8	10	26	1	17	14	3	8	2	2	7	2	2	2	(4)	107
Totals	87	131	173	747	35	344	184	266	310	263	220	210	115	486	230	(716)	3,801
Total banded	13,095	15,182	25,372	47,925	6,931	26,427	23,866	20,966	21,889	29,253	26,245	16,201	12,110	33,879	12,973	(46,852)	332,314
Recovery rate	0.66	0.86	0.68	1.56	0.50	1.30	0.77	1.27	1.42	0.90	0.84	1.30	0.95	1.43	1.77	(1.53)	1.14

[a]States without hunting seasons excluded.
[b]Includes dove recoveries from unknown locations in TX.

Table A-24. Distribution of direct recoveries of immature mourning doves banded preseason in the Central Management Unit, expressed as percentages of recoveries, 1967-74.

Area recovered[a]	Area banded MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)[b]	Totals
CMU																	
South Dakota		4.6	1.0	51.9													
Wyoming					12.5												
Nebraska																	
Missouri				0.2				68.7					0.9				
Kansas		1.2	0.5	1.4		2.3	3.5	1.8	49.6	0.7			0.3				
Colorado	22.7	2.3		0.7	12.5	2.3	1.8			40.0	0.8	0.4					
New Mexico	11.4	3.4	0.5	2.2	12.5	4.5	0.9		0.7	7.1	56.8	0.4		0.2		(0.2)	
Oklahoma	1.1	3.4	2.5	1.0		1.1	0.9	1.0	2.8	1.4		54.3	2.2				
Arkansas			0.5				0.9	0.4					86.2				
North Texas	3.4	18.4	13.4	7.7	9.4	14.8	16.7	1.8	16.8	6.4	7.6	23.8	1.9	78.6	11.3	(57.7)	
South Texas	2.3	13.8	21.8	8.9		13.6	25.4	3.7	8.4	0.7	0.8	2.7	1.2	9.3	78.4	(30.8)	
(Texas)[b]	(5.7)	(32.2)	(35.2)	(16.6)	(9.4)	(28.4)	(42.1)	(5.8)	(25.2)	(7.1)	(8.3)	(26.6)	(3.1)	(88.1)	(91.2)	(89.0)	
Subtotals	40.9	47.1	40.1	74.0	46.9	38.6	50.0	77.8	78.3	56.4	65.9	81.6	92.8	88.3	91.2	(89.2)	73.4
EMU																	
Illinois					3.1		1.8	3.3		0.7							
Maryland								0.2									
Kentucky								0.4									
Tennessee								0.2									
North Carolina																	
South Carolina			1.0				2.6	1.0					0.6				
Georgia			3.0				4.4	1.6					0.9		0.5	(0.2)	
Alabama		2.3	3.5	0.2		1.1	4.4	1.6					0.3		0.5	(0.2)	
Mississippi			3.0	0.2		1.1		1.0					0.6				
Louisiana		4.6	11.9	2.2		1.1	11.4	4.1				0.4	2.8	0.2	2.4	(0.9)	
Florida		1.2	5.4	1.2			9.6	5.4									
Subtotals		8.0	27.7	3.8	3.1	3.4	34.2	18.9		0.7		0.4	5.3	0.2	3.4	(1.2)	7.6
WMU																	
Oregon																	
Idaho	2.3																
Utah	2.3																
Nevada																	
California	8.0		1.5		3.1			0.2		2.9							
Arizona	3.4	2.3	0.5	0.7	6.2					3.6							1.1
Subtotals	15.9	2.3	2.0	0.7	9.4			0.2		6.4							
MEXICO																	
NW Coast	2.3	1.2	2.0	0.7	12.5	1.1				4.3	3.8	1.2		0.4		(0.3)	
N. Highlands			1.5	0.2				0.2		2.1	1.5						
NE Coast			0.5	0.2				0.2		0.7				0.2		(0.2)	
W. Highlands	39.8	25.3	21.3	17.3	28.1	52.3	8.8	1.8	14.0	27.1	27.3	11.3	1.2	8.4	2.9	(6.7)	
C. Highlands		4.6	0.5	0.7		2.3		0.2	0.7	1.4		2.0		0.9	1.5	(1.1)	
South		1.2	1.0	0.5		1.1		0.2				0.8		0.4		(0.3)	
Yucatan Pen.																	
Unknown	1.1			0.5			1.8	0.2	0.7		0.8	1.2					
Subtotals	43.2	32.2	26.7	20.2	40.6	56.8	10.5	2.9	15.4	35.7	33.3	16.4	1.2	10.4	4.4	(8.5)	16.2
CENTRAL AMERICA																	
Guatemala		4.6	1.0	0.2			1.8		2.1	0.7	0.8	0.8	0.6	0.7	0.5	(0.6)	
El Salvador		2.3	1.5	0.7		1.1	1.8	0.2	2.1			0.4			0.5	(0.2)	
Honduras		1.2	0.5				0.9		0.7					0.4		(0.3)	
Nicaragua		2.3	0.5	0.2			0.9		1.4								
Costa Rica												0.4					
Subtotals		10.3	3.5	1.2		1.1	5.3	0.2	6.3	0.7	0.8	1.6	0.6	1.1	1.0	(1.1)	1.7
Totals	100.0	99.9	100.0	99.9	100.0	99.9	100.0	100.0	100.0	99.9	100.0	100.0	99.9	100.0	100.0	(100.0)	100.0
Total banded	10,125	9,707	17,217	21,160	4,407	12,216	10,701	13,666	8,967	13,721	15,887	13,031	7,584	16,784	6,802	(23,586)	181,975
Total recoveries	88	87	202	416	32	88	114	486	143	140	132	256	319	453	204	(657)	3,160
Recovery rate	0.87	0.90	1.17	1.97	0.73	0.72	1.06	3.56	1.59	1.02	0.83	1.96	4.21	2.70	3.00	(2.79)	1.74

[a]States without hunting seasons excluded.
[b]Includes dove recoveries from unknown locations in TX.

Table A-25. Distribution of direct recoveries of adult male mourning doves banded preseason in the Central Management Unit, expressed as percentages of recoveries, 1967-74.

Area recovered[a]	Area banded MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)[b]	Totals
CMU																	
South Dakota			2.1	72.7													
Wyoming																	
Nebraska																	
Missouri							1.5	90.4	0.7				1.7				
Kansas				0.6				0.9	71.5						1.3	(0.3)	
Colorado	14.3			0.3		1.9				64.4							
New Mexico				0.6	20.0				0.7	9.2	84.3						
Oklahoma		4.8		0.3			3.1	0.9	0.7			76.7	1.7	0.7		(0.6)	
Arkansas							3.1						85.0				
North Texas		42.9	27.7	8.7		22.6	21.5	1.7	5.6	8.0	7.8	6.7	6.7	91.3	2.5	(71.4)	
South Texas	14.3	33.3	27.7	6.4		30.2	23.1	2.6	9.0	1.1		13.3	1.7	4.7	95.0	(24.9)	
(Texas)[b]	(14.3)	(76.2)	(55.3)	(15.1)		(52.8)	(44.6)	(4.3)	(14.6)	(9.2)	(7.8)	(20.0)	(8.3)	(96.0)	(97.5)	(96.4)	
Subtotals	28.6	81.0	57.4	89.5	20.0	54.7	52.3	96.5	88.2	82.8	92.2	96.7	96.7	96.8	98.8	(97.2)	87.2
EMU																	
Illinois							1.5										
Maryland																	
Kentucky				0.3													
Tennessee													1.7				
North Carolina																	
South Carolina																	
Georgia							1.5	0.9									
Alabama							4.6	0.9					1.7				
Mississippi			4.3	0.3			1.5										
Louisiana			6.4				12.3					3.3					
Florida			4.3				3.1										
Subtotals			14.9	0.6			24.6	1.7				3.3	3.3				2.2
WMU																	
Oregon																	
Idaho																	
Utah																	
Nevada																	
California																	
Arizona	28.6									3.4				0.4		(0.3)	
Subtotals	28.6									3.4				0.4		(0.3)	0.4
MEXICO																	
NW Coast	14.3	4.8		0.9		1.9			1.4	1.1	2.0						
N. Highlands				0.3		1.9					2.0			0.4		(0.3)	
NE Coast		4.8		0.3		1.9											
W. Highlands	14.3		19.1	4.9	80.0	22.6	12.3	0.9	6.2	11.5	3.9			2.2	1.3	(2.0)	
C. Highlands			4.3	0.6		5.7	1.5		0.7								
South				0.3		1.9	4.6	0.9	0.7								
Yucatan Pen.																	
Unknown				0.3													
Subtotals	28.6	9.5	23.4	7.6	80.0	35.8	18.5	1.7	9.0	12.6	7.8			2.5	1.3	(2.2)	8.2
CENTRAL AMERICA																	
Guatemala	14.3	4.8	2.1	0.9		3.8	3.1		1.4								
El Salvador				0.3		3.8	1.5			1.1				0.4		(0.3)	
Honduras			2.1	0.6													
Nicaragua		4.8		0.3		1.9			1.4								
Costa Rica				0.3													
Subtotals	14.3	9.5	4.3	2.3		9.4	4.6		2.8	1.1				0.4		(0.3)	1.9
Totals	100.1	100.0	100.0	100.0	100.0	99.9	100.0	99.9	100.0	99.9	100.0	100.0	100.0	100.1	100.1	(100.0)	99.9
Total banded	1,723	3,418	5,595	17,096	1,703	9,446	9,126	4,522	7,601	8,758	6,467	1,757	2,823	10,979	3,774	(14,753)	94,788
Total recoveries	7	21	47	344	5	53	65	115	144	87	51	30	60	277	80	(357)	1,386
Recovery rate	0.41	0.61	0.84	2.01	0.29	0.56	0.71	2.54	1.89	0.99	0.79	1.71	2.13	2.52	2.12	(2.42)	1.46

[a] States without hunting seasons excluded.
[b] Includes dove recoveries from unknown locations in TX.

Table A-26. Distribution of direct recoveries of adult female mourning doves banded preseason in the Central Management Unit, expressed as percentages of recoveries, 1967-74.

Area recovered[a]	Area banded																
	MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)[b]	Totals
CMU																	
South Dakota				62.9						1.8							
Wyoming																	
Nebraska																	
Missouri		16.7						72.3					2.4				
Kansas		8.3		1.4				1.5	77.5								
Colorado				0.7					1.1	60.7							
New Mexico		8.3		2.8						7.1	61.1						
Oklahoma			11.1	0.7					1.1			45.5	2.4				
Arkansas								3.1					85.4				
North Texas		33.3	22.2	9.1		35.7	30.4	3.1	6.7	1.8	5.6	22.7	4.9	86.7	2.9	(63.7)	
South Texas		8.3	22.2	13.3		25.0	17.4	1.5	7.9			9.1	2.4	2.2	97.1	(28.2)	
(Texas)[b]		(41.7)	(44.4)	(22.4)		(60.7)	(47.8)	(4.6)	(14.6)	(1.8)	(5.6)	(31.8)	(7.3)	(88.9)	(100.0)	(91.9)	
Subtotals		75.0	55.6	90.9		60.7	47.8	81.5	94.4	71.4	66.7	77.3	97.6	88.9	100.0	(91.9)	83.5
EMU																	
Illinois								1.5									
Maryland																	
Kentucky																	
Tennessee								1.5									
North Carolina																	
South Carolina																	
Georgia							4.3	1.5									
Alabama							4.3	3.1									
Mississippi								1.5									
Louisiana			22.2				13.0	3.1									
Florida								1.5					2.4				
Subtotals			22.2				21.7	13.8					2.4				3.0
WMU																	
Oregon																	
Idaho																	
Utah																	
Nevada																	
California																	
Arizona				0.7	50.0					5.4							
Subtotals				0.7	50.0					5.4							0.8
MEXICO																	
NW Coast				1.4						1.8	5.6						
N. Highlands						3.6					5.6						
NE Coast														1.1		(0.8)	
W. Highlands	100.0	25.0	11.1	4.2	50.0	17.9	8.7		5.6	16.1	16.7	22.7		6.7		(4.8)	
C. Highlands			5.6			3.6	8.7			3.6	5.6						
South Yucatan Pen.																	
Unknown				0.7						1.8				1.1		(0.8)	
Subtotals	100.0	25.0	16.7	6.3	50.0	25.0	17.4		5.6	23.2	33.3	22.7		8.9		(6.4)	10.3
CENTRAL AMERICA																	
Guatemala			5.6			7.1	13.0	4.6									
El Salvador				1.4		7.1								1.1		(0.8)	
Honduras				0.7										1.1		(0.8)	
Nicaragua																	
Costa Rica																	
Subtotals			5.6	2.1		14.3	13.0	4.6						2.2		(1.6)	2.5
Totals	100.0	100.0	100.1	100.0	100.0	100.0	99.9	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	(99.9)	100.1
Total banded	1,055	1,664	1,974	9,093	536	4,473	3,850	2,682	5,183	6,728	3,710	1,226	1,567	5,253	1,745	(6,998)	50,739
Total recoveries	2	12	18	143	2	28	23	65	89	56	18	22	41	30	34	(124)	643
Recovery rate	0.19	0.72	0.91	1.57	0.37	0.63	0.60	2.42	1.72	0.83	0.49	1.79	2.62	1.71	1.95	(1.77)	1.27

[a] States without hunting seasons excluded.
[b] Includes dove recoveries from unknown locations in TX.

Table A-27. Distribution of direct recoveries of adult mourning doves banded preseason in the Central Management Unit, expressed as percentages of recoveries, 1967-74.

Area recovered[a]	Area banded MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)[b]	Totals
CMU																	
South Dakota			1.4	69.5						0.7							
Wyoming																	
Nebraska																	
Missouri		5.9					1.1	83.4	0.4				1.9				
Kansas		2.9		0.8				1.1	73.7			1.7			0.8	(0.2)	
Colorado	11.1			0.4		1.2			0.4	62.9							
New Mexico		2.9		1.2	14.3				0.4	8.4	78.6						
Oklahoma		2.9	2.9	0.4			2.2	0.6	0.8			66.7	1.9	0.5		(0.4)	
Arkansas							2.2	1.1					85.4				
North Texas		38.2	24.6	9.0		27.7	23.3	2.2	5.9	5.6	7.1	11.7	5.8	90.4	2.3	(67.9)	
South Texas	11.1	23.5	26.1	8.4		28.9	22.2	2.8	8.9	0.7		10.0	1.9	4.1	95.5	(27.5)	
(Texas)[b]	(11.1)	(61.8)	(50.7)	(17.4)		(56.6)	(45.6)	(5.0)	(14.8)	(6.3)	(7.1)	(21.7)	(7.8)	(94.6)	(98.5)	(95.6)	
Subtotals	22.2	76.5	55.1	89.6	14.3	57.8	51.1	91.2	90.7	78.3	85.7	90.0	97.1	95.1	99.2	(96.2)	86.2
EMU																	
Illinois							1.1	0.6									
Maryland																	
Kentucky				0.2													
Tennessee								0.6					1.0				
North Carolina																	
South Carolina																	
Georgia			1.4				2.2	1.1									
Alabama							4.4	1.7					1.0				
Mississippi			2.9	0.2			1.1	0.6									
Louisiana			10.1				12.2	1.1				1.7					
Florida			4.4				2.2	0.6					1.0				
Subtotals			18.8	0.4			23.3	6.1				1.7	2.9				2.4
WMU																	
Oregon																	
Idaho																	
Utah																	
Nevada																	
California				0.2													
Arizona	22.2			0.2	14.3					4.2				0.3		(0.2)	
Subtotals	22.2			0.4	14.3					4.2				0.3		(0.2)	0.6
MEXICO																	
NW Coast	11.1	2.9		1.0		1.2			1.3	1.4	2.9						
N. Highlands				0.2		2.4					2.9			0.3		(0.2)	
NE Coast		2.9		0.2		1.2								0.3		(0.2)	
W. Highlands	33.3	8.8	15.9	5.0	71.4	20.5	12.2	0.6	5.1	13.3	7.1	8.3		3.1	0.8	(2.5)	
C. Highlands			5.8	0.4		4.8	3.3		0.8	1.4	1.4						
South				0.2		1.2	3.3	0.6	0.4								
Yucatan Pen.																	
Unknown				0.4						0.7				0.3		(0.2)	
Subtotals	44.4	14.7	21.7	7.4	71.4	31.3	18.9	1.1	7.6	16.8	14.3	8.3		3.9	0.8	(3.1)	8.7
CENTRAL AMERICA																	
Guatemala	11.1	2.9	2.9	0.6		4.8	5.6	1.7	0.8								
El Salvador		2.9		0.6		4.8	1.1			0.7				0.5		(0.4)	
Honduras			1.4	0.6										0.3		(0.2)	
Nicaragua		2.9		0.2		1.2			0.8								
Costa Rica				0.2													
Subtotals	11.1	8.8	4.4	2.2		10.8	6.7	1.7	1.7	0.7				0.8		(0.6)	2.1
Totals	99.9	100.0	100.0	100.0	100.0	99.9	100.0	100.1	100.0	100.0	100.0	100.0	100.0	100.1	100.0	(100.1)	100.0
Total banded	2,970	5,475	8,155	26,765	2,524	14,211	13,165	7,300	12,922	15,532	10,358	3,170	4,526	17,095	6,171	(23,266)	150,339
Total recoveries	9	34	69	501	7	83	90	181	236	143	70	60	103	387	133	(520)	2,106
Recovery rate	0.30	0.62	0.85	1.87	0.28	0.58	0.68	2.48	1.83	0.92	0.68	1.89	2.28	2.26	2.16	(2.24)	1.40

[a] States without hunting seasons excluded.
[b] Includes dove recoveries from unknown locations in TX.

Table A-28. Distribution of direct recoveries of all mourning doves banded preseason in the Central Management Unit, expressed as percentages of recoveries, 1967-74.

Area recovered[a]	Area banded MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)[b]	Totals
CMU																	
South Dakota		3.3	1.1	61.5						0.4							
Wyoming					10.3												
Nebraska													1.2				
Missouri		1.6		0.1			0.5	72.7	0.3								
Kansas		1.6	0.4	1.1		1.2	2.0	1.6	64.6	0.4		0.3	0.2		0.3	(0.1)	
Colorado	21.6	1.6		0.5	10.3	1.8	1.0		0.3	51.6	0.5	0.3					
New Mexico	10.3	3.3	0.4	1.6	12.8	2.3	0.5		0.5	7.8	64.4	0.3		0.1		(0.1)	
Oklahoma	1.0	3.3	2.6	0.6		0.6	1.5	0.9	1.6	0.7		56.6	2.1	0.2		(0.2)	
Arkansas			0.4				1.5	0.6					86.0				
North Texas	3.1	24.0	16.2	8.4	7.7	21.0	19.6	2.0	10.0	6.0	7.4	21.5	2.8	84.0	7.7	(62.2)	
South Texas	3.1	16.5	22.9	8.6		21.0	24.0	3.4	8.7	0.7	0.5	4.1	1.4	6.9	85.2	(29.3)	
(Texas)[b]	(6.2)	(40.5)	(39.1)	(17.0)	(7.7)	(42.1)	(43.6)	(5.6)	(18.7)	(6.7)	(7.9)	(25.6)	(4.3)	(91.1)	(94.1)	(91.9)	
Subtotals	39.2	55.4	43.9	82.6	41.0	48.0	50.5	81.4	86.0	67.5	72.8	83.2	93.8	91.4	94.4	(92.3)	78.5
EMU																	
Illinois					2.6		1.5	2.6		0.4							
Maryland								0.2									
Kentucky				0.1				0.3									
Tennessee								0.3					0.2				
North Carolina																	
South Carolina			0.7				1.5	0.8									
Georgia			2.6				3.4	1.5					0.5				
Alabama		1.6	2.6	0.1		0.6	4.4	1.6					1.0		0.3	(0.1)	
Mississippi			3.0	0.2		0.6	0.5	0.9					0.2		0.3	(0.1)	
Louisiana		3.3	11.4	1.0		0.6	11.8	3.3				0.6	2.1	0.1	1.5	(0.5)	
Florida		0.8	5.2	0.5			6.4	4.0					0.7				
Subtotals		5.8	25.5	2.0	2.6	1.8	29.4	15.4		0.4		0.6	4.7	0.1	2.1	(0.7)	5.5
WMU																	
Oregon																	
Idaho	2.0																
Utah	2.1																
Nevada																	
California	7.2		1.1	0.1	2.6			0.2		1.4							
Arizona	5.2	1.6	0.4	0.4	7.7					3.9				0.1		(0.1)	
Subtotals	16.5	1.6	1.5	0.5	10.3			0.2		5.3				0.1		(0.1)	0.9
MEXICO																	
NW Coast	3.1	1.6	1.5	0.9	10.3	1.2			0.8	2.8	3.5	1.0		0.2		(0.2)	
N. Highlands			1.1	0.2		1.2		0.2		1.1	2.0			0.1		(0.1)	
NE Coast		0.8	0.4	0.2		0.6		0.2		0.4				0.2		(0.2)	
W. Highlands	39.2	20.7	19.9	10.6	35.9	36.8	10.3	1.5	8.4	20.1	20.3	10.8	1.0	6.0	2.1	(4.8)	
C. Highlands		3.3	1.8	0.5		3.5	1.5	0.2	0.8	1.4	0.5	1.6		0.5	0.9	(0.6)	
South		0.8	0.7	0.3		1.2	1.5	0.3	0.3			0.6		0.2		(0.2)	
Yucatan Pen.				0.4													
Unknown	1.0						1.0	0.2	0.3	0.4	0.5	1.0		0.1		(0.1)	
Subtotals	43.3	27.3	25.5	13.2	46.2	44.4	14.2	2.4	10.6	26.2	26.7	14.9	1.0	7.4	3.0	(6.1)	13.2
CENTRAL AMERICA																	
Guatemala	1.0	4.1	1.5	0.4		2.3	3.4	0.4	1.3	0.4	0.5	0.6	0.5	0.4	0.3	(0.3)	
El Salvador		2.5	1.1	0.6		2.9	1.5	0.2	0.8	0.4		0.3		0.2	0.3	(0.2)	
Honduras		0.8	0.7	0.3			0.5		0.3					0.4		(0.2)	
Nicaragua		2.5	0.4	0.2		0.6	0.5		1.1								
Costa Rica				0.1								0.3					
Subtotals	1.0	9.9	3.7	1.7		5.8	5.9	0.6	3.4	0.7	0.5	1.3	0.5	1.0	0.6	(0.8)	1.8
Totals	100.0	100.0	100.1	100.0	100.1	100.0	100.0	100.0	100.0	100.1	100.0	100.0	100.0	100.0	100.1	(100.0)	99.9
Total banded	13,095	15,182	25,372	47,925	6,931	26,427	23,866	20,966	21,889	29,253	26,245	16,201	12,110	33,879	12,973	(46,852)	332,314
Total recoveries	97	121	271	917	39	171	204	667	379	283	202	316	422	840	337	(1,177)	5,266
Recovery rate	0.74	0.80	1.07	1.91	0.56	0.65	0.85	3.18	1.73	0.97	0.77	1.95	3.48	2.48	2.60	(2.51)	1.58

[a] States without hunting seasons excluded.
[b] Includes dove recoveries from unknown locations in TX.

Percentage of

Area recovered	MT	ID	ND	SD	WY	NE	KS	MN	IA	MO	AR	LA	MS	AL	GA	(TX)[b]	Totals
CMU																	
South Dakota			1.2	0.5	41.8									0.4		(0.3)	
Wyoming						4.5								0.4		(0.3)	
Nebraska				0.2			5.0							0.4		(0.3)	
Missouri			0.2					4.8	65.2	0.2	1.3		1.2	0.4		(0.3)	
Kansas		3.5	0.5	1.0		3.0			1.4	55.4			5.2	0.4		(0.3)	
Colorado	1.54	1.2		0.1	4.5						93.4	0.7		0.4		(0.3)	
New Mexico	7.5	1.2	0.9	0.7	14.3	3.4			0.8	5.0	43.2	0.6		0.4		(0.3)	
Oklahoma		3.5	0.9	1.4		0.6		3.6	0.7	0.8		29.4	2.	1.6	0.5	(1.4)	
Arkansas									1.4			1.2	77.0	0.4	0.5	(0.6)	
North Texas	13.4	17.4	13.1	16.1	9.5	14.3	16.9	3.5	12.4	8.4	11.6	28.5	4.0	74.4	7.3	(53.4)	
South Texas	3.0	20.9	21.5	11.0		6.7	32.5	4.2	9.1	0.8	1.4	11.6		7.8	82.7	(31.2)	
(Texas)[b]	(16.4)	(38.4)	(34.6)	(27.1)	(9.5)	(21.1)	(49.4)	(7.7)	(21.5)	(9.2)	(13.0)	(40.7)	(5.4)	(82.6)	(91.8)	(85.5)	
Subtotals	37.3	48.8	39.2	72.6	38.1	66.3	57.8	76.9	79.3	60.5	56.8	76.7	87.8	87.6	93.6	(89.5)	69.7
LMU																	
Illinois							3.6	4.9									
Maryland																	
Kentucky	1.5		0.9			0.6		0.7									
Tennessee							1.2										
North Carolina								0.7									
South Carolina		1.2											1.4				
Georgia			2.8				1.2	2.1					1.4				
Alabama			3.7	0.3			3.6	2.1					1.4				
Mississippi								2.1					4.0				
Louisiana			2.8	0.3			3.6	2.8				1.2	1.4	0.8	2.7	(1.4)	
Florida			2.8				2.4	1.4					1.4				
Subtotals	1.5	1.2	13.1	0.7		0.6	15.7	16.8				1.2	10.8	0.8	2.7	(1.4)	3.6
WMU																	
Oregon										0.8							
Idaho											0.7						
Utah	1.5									1.7	0.7						
Nevada	3.0										1.4						
California	9.0			0.3	4.8	0.6	1.2	0.7		4.2	6.2			0.4		(0.3)	
Arizona	6.0			0.3	23.8	0.6		0.7		4.2	8.2						
Subtotals	19.4			0.7	28.6	1.1	1.2	1.4		10.9	17.1			0.4		(0.3)	3.3
MEXICO																	
NW Coast	3.0	3.5				1.1			1.6	2.5	2.7	1.2		0.4		(0.3)	
N. Highlands	6.0	1.2	0.9	0.7		2.3		0.7	0.8		1.4			0.4		(0.3)	
NE Coast			0.9	0.7					1.6	0.6		1.7			0.9	(0.3)	
W. Highlands	28.4	29.1	32.7	16.8	33.3	20.0	12.0	3.5	9.9	17.6	15.1	11.6		7.4	2.7	(6.0)	
C. Highlands	1.5	5.8	5.6	1.0		1.7	3.6			0.8	2.7	1.2		0.8		(0.6)	
South Yucatan Pen.			1.9			0.6			0.8		0.7	1.2					
Unknown	1.5	3.5	0.9	1.0		2.3	1.2		1.6	5.9	2.0	1.7		1.6		(1.1)	
Subtotals	40.3	43.0	43.0	20.5	33.3	28.0	16.9	4.2	16.5	27.7	24.7	18.6		10.7	3.6	(8.5)	20.3
CENTRAL AMERICA																	
Guatemala	1.5	2.3	1.9	1.4		2.3	3.6		0.8		1.4	0.6	1.4				
El Salvador				1.7		1.1	3.6	0.7	3.3	0.8		2.3		0.4		(0.3)	
Honduras		2.3	1.9	1.7			1.2					0.6					
Nicaragua		2.3		0.3		0.6						0.6					
Costa Rica			0.9	0.3													
Subtotals	1.5	7.0	4.7	5.5		4.0	8.4	0.7	4.1	0.8	1.4	4.1	1.4	0.4		(0.3)	3.1
Totals	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.9	100.0	100.1	100.0	99.9	99.9	(100.0)	100.0
Total banded	10,125	9,707	17,217	21,160	4,407	12,216	10,701	13,666	8,967	13,721	15,887	13,031	7,584	16,784	6,802	(23,586)	181,975
Total recoveries	67	86	107	292	21	176	83	143	121	119	146	172	74	242	110	(352)	1,95[a]
Recovery rate	0.66	0.89	0.62	1.38	0.48	1.44	0.78	1.05	1.35	0.87	0.92	1.32	0.98	1.44	1.62	(1.49)	1.08

[a] States without hunting seasons excluded.
[b] Includes dove recoveries from unknown locations in TX.

Table A-30. Distribution of indirect recoveries of adult male mourning doves banded preseason in the Central Management Unit, expressed as percentages of recoveries, 1967-74.

Area recovered[a]	Area banded MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)[b]	Totals
CMU																	
South Dakota				53.0		0.8											
Wyoming					20.0												
Nebraska				1.0		36.6											
Missouri			2.7	0.3			3.0	82.3									
Kansas		3.0	2.7			0.8		1.0	67.8					0.6		(0.4)	
Colorado	8.3				10.0	0.8				59.0	4.3			0.6		(0.4)	
New Mexico		3.0		2.0		3.3			0.8	14.1	65.2			0.6		(0.4)	
Oklahoma		6.1		1.7		0.8	3.0	1.0	0.8			47.8		1.2	1.2	(1.2)	
Arkansas			2.7										77.3				
North Texas	16.7	18.2	13.5	14.5	20.0	18.7	20.9	4.2	13.6	7.7	6.5	17.4		85.3	3.6	(57.5)	
South Texas		24.2	18.9	8.8		11.4	26.9	3.1	4.2	3.8		13.0		3.1	92.9	(33.6)	
(Texas)[b]	(16.7)	(45.5)	(32.4)	(23.3)	(20.0)	(30.1)	(47.8)	(7.3)	(17.8)	(11.5)	(6.5)	(30.4)		(89.6)	(96.4)	(91.9)	
Subtotals	25.0	57.6	40.5	81.4	50.0	73.2	53.7	91.7	87.3	84.6	76.1	78.3	77.3	92.6	97.6	(94.3)	80.2
EMU																	
Illinois							3.0	3.1									
Maryland																	
Kentucky																	
Tennessee																	
North Carolina							1.5										
South Carolina																	
Georgia			2.7				3.0										
Alabama							3.0			1.3							
Mississippi																	
Louisiana			2.7				3.0						13.6	0.6		(0.4)	
Florida			10.8				1.5										
Subtotals			16.2				14.9	3.1		1.3			13.6	0.6		(0.4)	2.0
WMU																	
Oregon											2.2						
Idaho				0.3													
Utah										1.3							
Nevada																	
California																	
Arizona	16.7			0.7	10.0						4.3						
Subtotals	16.7			1.0	10.0					1.3	6.5						0.8
MEXICO																	
NW Coast	25.0	3.0		1.7		3.2	3.0	1.0		3.8	10.9			1.2		(0.8)	
N. Highlands				1.0		0.8					2.2			0.6		(0.4)	
NE Coast			5.4	0.7					1.7			4.3					
W. Highlands	16.7	27.3	13.5	10.1	40.0	16.3	13.4	1.0	8.5	7.7	4.3	17.4	4.5	3.7		(2.4)	
C. Highlands		6.1	8.1	1.7			7.5	2.1	0.8					0.6		(0.4)	
South			8.1				1.5		0.8								
Yucatan Pen.																	
Unknown				1.0			1.5			1.3				0.6		(0.4)	
Subtotals	41.7	36.4	35.1	16.2	40.0	20.3	26.9	4.2	11.9	12.8	17.4	21.7	4.5	6.7		(4.4)	14.7
CENTRAL AMERICA																	
Guatemala		6.1	2.7	0.3		1.6	3.0		0.8								
El Salvador			5.4	0.7		2.4	1.5						4.5		2.4	(0.8)	
Honduras	16.7					2.4		1.0									
Nicaragua				0.3													
Costa Rica																	
Subtotals	16.7	6.1	8.1	1.4		6.5	4.5	1.0	0.8				4.5		2.4	(0.8)	2.2
Totals	100.1	100.1	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.9	100.0	(99.9)	99.9
Total banded	1,723	3,418	5,595	17,096	1,703	9,446	9,126	4,522	7,601	8,758	6,467	1,757	2,823	10,979	3,774	(14,753)	94,788
Total recoveries	12	33	37	296	10	123	67	96	118	78	46	23	22	163	84	(247)	1,208
Recovery rate	0.70	0.97	0.66	1.73	0.59	1.30	0.73	2.12	1.55	0.89	0.71	1.30	0.78	1.48	2.23	(1.67)	1.27

[a] States without hunting seasons excluded.
[b] Includes dove recoveries from unknown locations in TX.

Table A-31. Distribution of indirect recoveries of adult female mourning doves banded preseason in the Central Management Unit, expressed as percentages of recoveries, 1967-74.

Area recovered[a]	Area banded MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)[b]	Totals
CMU																	
South Dakota				50.0						1.5							
Wyoming					33.3												
Nebraska						43.2											
Missouri			4.2				3.0	73.1									
Kansas		11.1							62.9					1.4		(1.0)	
Colorado	16.7			1.3		2.3				53.0	4.0						
New Mexico				1.3						6.1	64.0						
Oklahoma						2.3		3.8	2.9			42.9					
Arkansas							3.0	3.8					76.5				
North Texas	16.7	33.3	37.5	13.3		9.1	18.2		8.6	6.1	12.0	28.6	11.8	83.1	4.0	(62.5)	
South Texas		22.2	25.0	8.7		11.4	30.3	3.8	4.3	3.0		7.1	5.9	2.8	84.0	(24.0)	
(Texas)[b]	(16.7)	(55.6)	(62.5)	(22.0)		(20.5)	(48.5)	(3.8)	(12.9)	(9.1)	(12.0)	(35.7)	(17.6)	(85.9)	(88.0)	(86.5)	
Subtotals	33.3	66.7	66.7	74.7	33.3	68.2	54.5	84.6	78.6	69.7	80.0	78.6	94.1	87.3	88.0	(87.5)	75.3
EMU																	
Illinois																	
Maryland				0.7													
Kentucky																	
Tennessee																	
North Carolina																	
South Carolina																	
Georgia			4.2														
Alabama			4.2				6.1								4.0	(1.0)	
Mississippi																	
Louisiana							6.1	3.8					5.9	1.4		(1.0)	
Florida																	
Subtotals			8.3	0.7			12.1	3.8					5.9	1.4	4.0	(2.1)	1.9
WMU																	
Oregon																	
Idaho	16.7																
Utah																	
Nevada																	
California																	
Arizona	16.7									3.0	4.0						
Subtotals	33.3									3.0	4.0						0.9
MEXICO																	
NW Coast *				2.0		2.3				6.1	4.0						
N. Highlands			4.2	2.0						1.5	8.0						
NE Coast								3.8									
W. Highlands	16.7	33.3	12.5	12.7	33.3	20.4	15.2	3.8	17.1	16.7		14.3		7.0	8.0	(7.3)	
C. Highlands				2.0		2.3			1.4	1.5				1.4		(1.0)	
South				0.7			3.0										
Yucatan Pen.																	
Unknown	16.7			1.3		2.3	3.0				4.0	7.1		1.4		(1.0)	
Subtotals	33.3	33.3	16.7	20.7	33.3	27.3	21.2	7.7	18.6	25.8	16.0	21.4		9.9	8.0	(9.4)	18.5
CENTRAL AMERICA																	
Guatemala			8.3	2.0	33.3	2.3	9.1		2.9								
El Salvador				2.0				3.8						1.4		(1.0)	
Honduras																	
Nicaragua						2.3	3.0			1.5							
Costa Rica																	
Subtotals			8.3	4.0	33.3	4.5	12.1	3.8	2.9	1.5				1.4		(1.0)	3.4
Totals	99.9	100.0	100.0	100.1	99.9	100.0	99.9	99.9	100.1	100.0	100.0	100.0	100.0	100.0	100.0	(100.0)	100.0
Total banded	1,055	1,664	1,974	9,093	536	4,473	3,850	2,682	5,183	6,728	3,710	1,226	1,567	5,253	1,745	(6,998)	50,739
Total recoveries	6	9	24	150	3	44	33	26	70	66	25	14	17	71	25	(96)	583
Recovery rate	0.57	0.54	1.22	1.65	0.56	0.98	0.86	0.97	1.35	0.98	0.67	1.14	1.08	1.35	1.43	(1.37)	1.15

[a] States without hunting seasons excluded.
[b] Includes dove recoveries from unknown locations in TX.

Table A-32. Distribution of indirect recoveries of adult mourning doves banded preseason in the Central Management Unit, expressed as percentages of recoveries, 1967-74.

Area recovered[a]	Area banded																
	MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)[b]	Totals
CMU																	
South Dakota				51.9		0.6				0.7							
Wyoming					21.4									0.4		(0.3)	
Nebraska				0.7		38.1											
Missouri			3.0	0.2			3.0	80.5						0.8		(0.5)	
Kansas		4.4	1.5			0.6		0.8	66.1					0.4		(0.3)	
Colorado	10.0			0.4	7.1	1.2				56.2	4.0			0.8		(0.5)	
New Mexico		2.2		1.8		2.4			0.5	10.4	66.2			1.2	0.8	(1.1)	
Oklahoma		4.4		1.1		1.2	2.0	1.6	1.6			47.4					
Arkansas			3.0				1.0	0.8					75.6			(57.1)	
North Texas	15.0	22.2	22.7	14.3	21.4	16.7	20.8	3.2	11.6	6.9	8.1	21.0	7.3	83.6	3.3	(31.9)	
South Texas		22.2	19.7	9.0		11.3	27.7	3.2	4.2	3.5		10.5	2.4	2.9	90.8	(89.6)	
(Texas)[b]	(15.0)	(46.7)	(42.4)	(23.3)	(21.4)	(28.0)	(48.5)	(6.5)	(15.9)	(10.4)	(8.1)	(31.6)	(9.8)	(87.3)	(94.2)	(92.3)	78.7
Subtotals	25.0	57.8	50.0	79.3	50.0	72.0	54.5	90.2	84.1	77.8	78.4	79.0	85.4	91.0	95.0		
EMU							2.0	2.4									
Illinois				0.2													
Maryland																	
Kentucky																	
Tennessee							1.0										
North Carolina																	
South Carolina							2.0								0.8	(0.3)	
Georgia			3.0				4.0			0.7							
Alabama			1.5										9.8	0.8		(0.6)	
Mississippi							4.0	0.8									
Louisiana			1.5				1.0										
Florida			6.1				13.9	3.2		0.7			9.8	0.8	0.8	(0.8)	1.9
Subtotals			12.1	0.2							1.4						
WMU																	
Oregon		2.2															
Idaho	5.0			0.2						0.7							
Utah																	
Nevada																	
California										1.4	4.0						0.9
Arizona	15.0			0.4	7.1					2.1	5.4						
Subtotals	20.0	2.2		0.7	7.1									0.8		(0.5)	
MEXICO										4.9	8.1			0.4		(0.3)	
NW Coast	20.0	2.2		1.8	7.1	3.0	2.0	0.8		0.7	4.0					(0.3)	
N. Highlands			1.5	1.3		0.6						2.6			0.8	(3.8)	
NE Coast			3.0	0.4				0.8	1.1					4.9	1.7	(0.5)	
W. Highlands	20.0	26.7	15.2	11.0	28.6	17.3	13.9	1.6	11.6	11.8	2.7	15.8	2.4	0.8			
C. Highlands		4.4	4.5	1.8		0.6	5.0	1.6	1.1	0.7							
South			6.1	0.2			2.0		0.5								
Yucatan Pen.										0.7	1.4	2.6		0.8		(0.5)	
Unknown	5.0	2.2		1.1		0.6	2.0										
Subtotals	45.0	35.6	30.3	17.6	35.7	22.0	24.8	4.9	14.3	18.8	16.2	21.0	2.4	7.8	2.5	(6.0)	16.0
CENTRAL AMERICA																	
Guatemala		4.4	4.5	0.9	7.1	1.8	5.0		1.6				2.4	0.4	1.7	(0.8)	
El Salvador			3.0	1.1		1.8	1.0	0.8									
Honduras	10.0					1.8		0.8									
Nicaragua				0.2		0.6	1.0			0.7							
Costa Rica													2.4	0.4	1.7	(0.8)	2.6
Subtotals	10.0	4.4	7.6	2.2	7.1	6.0	6.9	1.6	1.6	0.7							
Totals	100.0	100.0	100.0	100.0	99.9	100.0	100.1	99.9	100.0	100.1	100.0	100.0	100.0	100.0	100.0	(99.9)	100.1
Total banded	2,970	5,475	8,155	26,765	2,524	14,211	13,165	7,300	12,922	15,532	10,358	3,170	4,526	17,095	6,171	(23,266)	150,339
Total recoveries	20	45	66	455	14	168	101	123	189	144	74	38	41	244	120	(364)	1,842
Recovery rate	0.67	0.82	0.81	1.70	0.55	1.18	0.77	1.68	1.46	0.93	0.71	1.20	0.91	1.43	1.94	(1.56)	1.22

[a]States without hunting seasons excluded.
[b]Includes dove recoveries from unknown locations in TX.

Table A-33. Distribution of indirect recoveries of all mourning doves banded preseason in the Central Management Unit, expressed as percentages of recoveries, 1967-74.

Area recovered[a]	Area banded MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)[b]	Totals
CMU																	
South Dakota		0.8	0.6	47.9		0.3				0.4				0.2		(0.1)	
Wyoming					14.3									0.2		(0.1)	
Nebraska				0.5		36.9								0.4		(0.3)	
Missouri			1.7	0.1			3.8	72.6	0.3	0.4		0.5	1.7	0.2		(0.1)	
Kansas		3.8	1.2	0.4		2.0		1.1	61.9			2.9		0.6		(0.4)	
Colorado	12.6	0.8		0.4	5.7	1.5				51.3	1.8			0.4		(0.3)	
New Mexico	5.8	1.5	0.6	1.3	8.6	2.9			0.6	8.0	50.9	0.5		0.6		(0.4)	
Oklahoma		3.8	0.6	1.2		0.9	2.7	1.1	1.3			32.9	1.7	1.4	0.9	(1.3)	
Arkansas			1.2				0.5	1.1				1.0	76.5	0.2	0.4	(0.3)	
North Texas	13.8	19.1	16.8	15.0	14.3	15.4	19.0	3.4	11.9	7.6	10.4	27.1	5.2	79.0	5.2	(55.3)	
South Texas	2.3	21.4	20.8	9.8		9.0	29.9	3.8	6.1	2.3	0.9	11.4	0.9	5.4	87.0	(31.6)	
(Texas)[b]	(16.1)	(41.2)	(37.6)	(24.8)	(14.3)	(24.4)	(48.9)	(7.1)	(18.1)	(9.9)	(11.4)	(39.0)	(7.0)	(85.0)	(93.0)	(87.6)	
Subtotals	34.5	51.9	43.4	76.7	42.9	68.9	56.0	83.1	82.3	70.0	64.1	76.7	87.0	89.3	94.4	(90.9)	74.0
EMU																	
Illinois							2.7	3.8									
Maryland				0.1													
Kentucky	1.2		0.6			0.3		0.4									
Tennessee							0.5										
North Carolina							0.5	0.4									
South Carolina		0.8											0.9				
Georgia			2.9				1.6	1.1					0.9				
Alabama			2.9	0.1			3.8	1.1		0.4			0.9		0.4	(0.1)	
Mississippi								1.1					2.6				
Louisiana			2.3	0.1			3.8	1.9				1.0	4.4	0.8	1.3	(1.0)	
Florida			4.0				1.6	0.8					0.9				
Subtotals	1.2	0.8	12.7	0.4		0.3	14.7	10.5		0.4		1.0	10.4	0.8	1.7	(1.1)	2.8
WMU																	
Oregon		0.8								0.4	0.4						
Idaho	1.2			0.1							0.4						
Utah	1.2									1.1	0.4						
Nevada	2.3										0.9						
California	6.9			0.1	2.9	0.3	0.5	0.4		1.9	4.1			0.2		(0.1)	
Arizona	8.0			0.4	17.1	0.3		0.4		2.7	6.8						
Subtotals	19.5	0.8		0.7	20.0	0.6	0.5	0.8		6.1	13.2			0.2		(0.1)	2.1
MEXICO																	
NW Coast	6.9	3.0		1.1	2.9	2.0	1.1	0.4	0.6	3.8	4.5	1.0		0.6	0.4	(0.6)	
N. Highlands	4.6	0.8	1.2	1.1		1.5		0.4	0.3	0.4	2.3			0.4		(0.3)	
NE Coast			1.7	0.5				0.4	1.3	0.4		1.9			0.4	(0.1)	
W. Highlands	26.4	28.2	26.0	13.3	31.4	18.6	13.0	2.6	11.0	14.4	10.9	12.4	0.9	6.2	2.2	(4.9)	
C. Highlands	1.2	5.3	5.2	1.5		1.2	4.4	0.8	0.6	0.8	1.8	1.0		0.8		(0.6)	
South Yucatan Pen.			3.5	0.1		0.3	1.1		0.6		0.4	1.0					
Unknown	2.3	3.0	0.6	1.2		1.7	1.6		0.6	3.0	1.8	1.9		1.2		(0.8)	
Subtotals	41.4	40.5	38.2	18.7	34.3	25.3	21.2	4.5	15.2	22.8	21.8	19.0	0.9	9.3	3.0	(7.3)	18.2
CENTRAL AMERICA																	
Guatemala	1.2	3.0	2.9	1.1	2.9	2.0	4.4		1.3		0.9	0.5	0.9				
El Salvador			1.2	1.3		1.5	2.2	0.8	1.3	0.4		1.9	0.9	0.4	0.9	(0.6)	
Honduras	2.3	1.5	1.2	0.7		0.9	0.5	0.4				0.5					
Nicaragua		1.5		0.3		0.6	0.5			0.4		0.5					
Costa Rica			0.6	0.1													
Subtotals	3.4	6.1	5.8	3.5	2.9	4.9	7.6	1.1	2.6	0.8	0.9	3.3	1.7	0.4	0.9	(0.6)	2.8
Totals	100.0	100.1	100.1	100.0	100.1	100.0	100.0	100.0	100.1	100.1	100.0	100.0	100.0	100.0	100.0	(100.0)	99.9
Total banded	13,095	15,182	25,372	47,925	6,931	26,427	23,866	20,966	21,889	29,253	26,245	16,201	12,110	33,879	12,973	(46,852)	332,314
Total recoveries	87	131	173	747	35	344	184	266	310	263	220	210	115	486	230	(716)	3,801
Recovery rate	0.66	0.86	0.68	1.56	0.50	1.30	0.77	1.27	1.42	0.90	0.84	1.30	0.95	1.43	1.77	(1.53)	1.14

[a]States without hunting seasons excluded.
[b]Includes dove recoveries from unknown locations in TX.

Table A-34. Distribution of direct recovery rate indices[a] for immature mourning doves banded preseason in the Central Management Unit, 1967-74.

Recovery area	Banding area															
	MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)
CMU																
South Dakota		4	1	102												
Wyoming					9								4			
Missouri				<1				244								
Kansas		1	1	3		2	4	7	79	1			1			
Colorado	20	2		1	9	2	2			41	1	1				
New Mexico	10	3	1	4	9	3	1		1	7	47	1		1		(<1)
Oklahoma	1	3	3	2		1	1	4	4	1		107	9			
Arkansas			1				1	1					363			
North Texas	3	16	16	15	7	11	18	7	27	7	6	47	8	212	34	(161)
South Texas	2	12	26	17		10	27	13	13	1	1	5	5	25	235	(86)
(Texas)[b]	(5)	(29)	(41)	(33)	(7)	(20)	(45)	(20)	(40)	(7)	(7)	(52)	(13)	(238)	(273)	(248)
CMU totals	36	42	47	146	34	28	53	277	125	58	55	160	390	238	273	(248)
EMU totals	0	7	33	8	2	2	36	67	0	1	0	1	22	1	10	(3)
WMU totals	14	2	2	1	7	0	0	1	0	7	0	0	0	0	0	(0)
U.S. totals	49	52	82	155	43	30	90	345	125	65	55	161	413	239	284	(252)
Southern Zone																
Mexico	38	29	31	40	29	41	11	10	25	36	28	32	5	28	13	(24)
Central America		9	4	2		1	6	1	10	1	1	3	3	3	3	(3)
Southern Zone totals	38	38	35	42	29	42	17	11	35	37	28	35	8	31	16	(27)
Grand totals	87	90	117	197	73	72	107	356	159	102	83	196	421	270	300	(279)
Numbers banded	10,125	9,707	17,217	21,160	4,407	12,216	10,701	13,666	8,967	13,721	15,887	13,031	7,584	16,784	6,802	(23,586)
Numbers of recoveries	88	87	202	416	32	88	114	486	143	140	132	256	319	453	186	(657)

[a]Recovery rate index = recovery rate x 10,000; these indices reflect the relative frequencies at which individual doves will be taken in given recovery locations. Example: An immature dove from SD or NE is 4 times as likely to be recovered in Mexico than an immature from IA or MO.
[b]Includes doves of unknown recovery location in TX.

Table A-35. Distribution of direct recovery rate indices[a] for adult mourning doves banded preseason in the Central Management Unit, 1967-74.

Recovery area	Banding area															
	MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)
CMU																
South Dakota			1	130												
Missouri		4					1	207	1				4			
Kansas		2		1				3	135			3			2	(<1)
Colorado	3			1		1			1	58						
New Mexico		2		2	4				1	8	53					
Oklahoma		2	2	1			2	1	2			126	4	1		(1)
Arkansas							2	3					194			
North Texas		24	21	17		16	16	5	11	5	5	22	13	205	5	(152)
South Texas	3	15	22	16		17	15	7	16	1		19	4	9	206	(61)
(Texas)[b]	(3)	(38)	(43)	(33)		(33)	(31)	(12)	(27)	(6)	(5)	(41)	(18)	(214)	(212)	(214)
CMU totals	7	47	47	168	4	34	35	226	166	72	58	170	221	215	214	(215)
EMU totals	0	0	16	1	0	0	16	15	0	0	0	3	7	0	0	(0)
WMU totals	7	0	0	1	4	0	0	0	0	4	0	0	0	1	0	(<1)
U.S. totals	13	47	63	169	8	34	51	241	166	76	58	174	228	216	214	(215)
Southern Zone																
Mexico	13	9	18	14	20	18	13	3	14	15	10	16		9	2	(7)
Central America	3	5	4	4		6	5	4	3	1				2		(1)
Southern Zone totals	17	15	22	18	20	25	17	7	17	16	10	16	0	11	2	(8)
Grand totals	30	62	85	187	28	58	68	248	183	92	68	189	228	226	216	(223)
Numbers banded	2,970	5,475	8,155	26,765	2,524	14,211	13,165	7,300	12,922	15,532	10,358	3,170	4,526	17,095	6,171	(23,266)
Numbers of recoveries	9	34	69	501	7	83	90	181	236	143	70	60	103	387	133	(520)

[a]Recovery rate index = recovery rate x 10,000; these indices reflect the relative frequencies at which individual doves will be taken in given recovery locations. Example: An adult dove from SD, NE, or IA is about 10 times as likely to be recovered in TX than an adult from MT.

[b]Includes doves of unknown recovery location in TX.

Table A-36. Distribution of direct recovery rate indices[a] for all mourning doves banded preseason in the Central Management Unit, 1967-74.

Recovery area	Banding area															
	MT	ND	MN	SD	WY	NE	IA	MO	KS	CO	NM	OK	AR	N.TX	S.TX	(TX)
CMU																
South Dakota		3	1	118						<1						
Wyoming					6											
Missouri		1		<1			<1	231	<1				4			
Kansas		1	<1	2		1	2	5	112	1		1	1		1	(<1)
Colorado	16	1		1	6	1	1		<1	50	<1	1				
New Mexico	8	3	<1	3	7	2	<1		1	8	50	1		<1		(<1)
Oklahoma	1	3	3	1		<1	1	3	3	1		110	7	1		(<1)
Arkansas			<1				1	2					300			
North Texas	2	19	17	16	4	14	17	6	17	6	6	42	10	208	20	(156)
South Texas	2	13	24	16		14	21	11	15	1	<1	8	5	17	221	(74)
(Texas)[b]	(5)	(32)	(42)	(33)	(4)	(27)	(37)	(18)	(32)	(6)	(6)	(50)	(15)	(226)	(244)	(231)
CMU totals	29	44	47	158	23	31	43	259	149	65	56	162	327	227	245	(232)
EMU totals	0	5	27	4	1	1	25	49	0	<1	0	1	17	<1	5	(2)
WMU totals	12	1	2	1	6	0	0	<1	0	5	0	0	0	<1	0	(<1)
U.S. totals	41	50	76	163	30	32	68	309	149	71	56	164	343	227	251	(234)
Southern Zone																
Mexico	32	22	27	25	26	29	12	8	18	25	21	29	3	18	8	(15)
Central America	1	8	4	3		4	5	2	6	1	<1	2	2	2	2	(2)
Southern Zone totals	33	30	31	29	26	33	17	10	24	26	21	31	5	21	9	(17)
Grand totals	74	80	107	191	56	65	85	318	173	97	77	195	348	248	260	(251)
Numbers banded	13,095	15,182	25,372	47,925	6,931	26,427	23,866	20,966	21,889	29,253	26,245	16,201	12,110	33,879	12,973	(46,852)
Numbers of recoveries	97	121	271	917	39	171	204	667	379	283	202	316	422	840	337	(1,177)

[a]Recovery rate index = recovery rate x 10,000; these indices reflect the relative frequencies at which individual doves will be taken in given recovery locations. Example: Individual doves from MT, WY, CO, or NM are much less likely to be recovered in TX than individual doves from other CMU States.
[b]Includes doves of unknown recovery location in TX.

Table A-37. Z-test of hypothesis that both adult and immature mourning doves have similar proportions of direct band recoveries occurring in State of banding.

State	Adult			Immature			Z-value[a]
	Total	In State	%	Total	In State	%	
Missouri	181	151	83.4	486	334	68.7	3.79***
Kansas	236	174	73.7	143	71	49.6	4.76***
Colorado	143	90	62.9	140	56	40.0	3.85***
New Mexico	70	55	78.6	132	75	56.8	3.08***
Oklahoma	60	40	66.7	256	139	54.3	1.74*
Arkansas	103	88	85.4	319	275	86.2	-0.20
North Texas	387	350	90.4	453	356	78.6	4.65***
South Texas	133	127	95.5	204	160	78.4	4.32***

[a]P<0.10*; P<0.01***.

Composite test statistic = 8.33***

Table A-38. Z-test of hypothesis that both adult male and female mourning doves have similar proportions of direct band recoveries occurring in State of banding.

State	Male			Female			Z-value[a]
	Total	In State	%	Total	In State	%	
Missouri	115	104	90.4	65	47	72.3	3.17***
Kansas	144	103	71.5	89	69	77.5	-1.01
Colorado	87	56	64.4	56	34	60.7	0.45
New Mexico	51	43	84.3	18	11	61.1	2.05**
Oklahoma	30	23	76.7	22	10	45.5	2.31**
Arkansas	60	51	85.0	41	35	85.4	-0.06
North Texas	277	253	91.3	90	78	86.7	1.28
South Texas	80	76	95.0	34	33	97.1	-0.50

[a] $P<0.05$**; $P<0.01$***.

Composite test statistic = 2.72***

Table A-39. Weighting factors for recoveries of mourning doves banded preseason in the U.S., 1967-75[a].

Area of banding	A	B	C			A X B / C		
	Land area weight	Mean no. of doves per route	Immature doves banded	Adult doves banded	All doves banded	Weighting factor (x 100) Immatures	Adults	All doves
EMU								
Massachusetts	5.31	6.54	18,524	5,671	24,195	0.19	0.61	0.14
Michigan	37.18	7.73	2,724	4,464	7,188	10.55	6.44	4.00
Wisconsin	36.07	11.71	9,174	4,122	13,296	4.60	10.25	3.18
Illinois	35.09	26.93	10,125	7,643	17,768	9.33	13.36	5.32
Indiana	23.36	28.39	18,833	6,403	25,236	3.52	10.36	2.63
Ohio	26.42	33.38	15,052	12,630	27,682	5.86	6.98	3.19
Virginia	26.05	24.66	17,252	9,752	27,004	3.72	6.59	2.38
Kentucky	26.08	25.69	5,132	2,134	7,266	13.06	31.40	9.22
Tennessee	27.07	19.31	19,736	6,807	26,543	2.65	7.68	1.97
South Carolina	19.99	27.96	29,063	11,004	40,067	1.92	5.08	1.39
Alabama	33.32	21.34	26,942	11,781	38,723	2.64	6.04	1.84
Mississippi	30.63	24.46	15,602	5,734	21,336	4.80	13.07	3.51
Louisiana	31.14	6.72	26,926	7,848	34,774	0.78	2.67	0.60
CMU								
Montana	94.47	10.63	10,125	2,970	13,095	9.92	33.81	7.67
North Dakota	45.54	29.07	9,707	5,475	15,182	13.64	24.18	8.72
Minnesota	54.09	12.15	17,217	8,155	25,372	3.82	8.06	2.59
South Dakota	49.20	33.49	21,160	26,765	47,925	7.79	6.16	3.44
Wyoming	62.33	10.61	4,407	2,524	6,931	15.01	26.20	9.54
Nebraska	49.69	42.65	12,216	14,211	26,427	17.35	14.91	8.02
Iowa	36.15	31.59	10,701	13,165	23,866	10.67	8.67	4.78
Missouri	45.10	36.25	13,666	7,300	20,966	11.96	22.40	7.80
Kansas	52.43	57.30	8,967	12,922	21,889	33.50	23.25	13.72
Colorado	67.18	15.65	13,721	15,532	29,253	7.66	6.77	3.59
New Mexico	77.98	14.14	15,887	10,358	26,245	6.94	10.65	4.20
Oklahoma	44.40	60.64	13,031	3,170	16,201	20.66	84.93	16.62
Arkansas	34.37	22.44	7,584	4,526	12,110	10.17	17.04	6.37
North Texas	127.83	18.50	16,784	17,095	33,879	14.09	13.83	6.98
South Texas	42.20	27.00	6,802	6,171	12,973	16.75	18.46	8.78
(Texas)	(170.03)	(20.50)	(23,586)	(23,266)	(46,852)	(14.78)	(14.98)	(7.44)
WMU								
Washington	43.87	9.19	7,096	1,627	8,723	5.68	24.78	4.62
Oregon	62.27	10.23	2,837	1,201	4,038	22.45	53.04	15.78
Idaho	54.37	11.86	1,580	1,397	2,977	40.81	46.16	21.66
Utah	53.34	11.63	6,222	8,833	15,055	9.97	7.02	4.12
Nevada	71.27	12.48	3,194	2,771	5,965	27.85	32.10	14.91
California	101.71	13.68	22,394	8,007	30,401	6.21	17.38	4.58
Arizona	72.65	42.34	12,595	8,786	21,381	24.42	35.01	14.39

[a]Mourning doves in the CMU were banded 1967-74.

Table A-40. Distribution and relative density of mourning dove harvest in the Central Management Unit. All doves, 1967-74.

Harvest area	No. of recoveries	Weighted totals[a]	% of harvest	Relative harvest density[b]
South Dakota	573	2,652.77	8.45	53.92
Missouri	522	4,013.16	12.79	88.98
Kansas	283	3,587.38	11.43	68.42
Colorado	189	838.55	2.67	12.48
New Mexico	199	948.98	3.02	12.17
Oklahoma	227	3,289.43	10.48	74.09
Arkansas	415	2,448.48	7.80	71.24
North Texas	1,198	8,417.85	26.82	65.85
South Texas	780	5,192.25	16.54	123.03
(Texas)	(1,978)	(13,610.10)	(43.36)	(80.05)
Total	4,386	31,388.85	100.00	--

[a]Each figure represents total weighted recoveries of all birds recovered in each harvest area (SD total adjusted upward to account for 2 years of nonharvest).
[b]Weighted recoveries divided by land area weight (Table 39, col. A).

Table A-41. Weighted distribution of the Southern Zone mourning dove harvest by Mexican State and Central American country. All doves - direct recoveries.

Harvest region No.	Harvest region States	No. of recoveries	Weighted recoveries	Mexican or C.A. harvest (%)	Southern Zone harvest (%)
1 - Northwest Coast	Baja California	13	121.76	2.0	1.8
	Nayarit	12	76.16	1.3	1.1
	Sinaloa	56	367.58	6.2	5.5
	Sonora	6	45.23	0.8	0.7
Subtotals		87	610.73	10.2	9.1
2 - Northern Highlands	Aguascalientes	0			
	Chihuahua	3	11.84	0.2	0.2
	Durango	3	14.59	0.2	0.2
	Zacatecas	15	107.14	1.8	1.6
Subtotals		21	133.57	2.2	2.0
3 - Northeast Coast	Coahuila	2	12.84	0.2	0.2
	Nuevo Leon	3	18.44	0.3	0.3
	San Luis Potosi	3	13.16	0.2	0.2
	Tamaulipas	3	13.87	0.2	0.2
Subtotals		11	58.31	1.0	0.9
4 - Western Highlands	Colima	16	83.33	1.4	1.2
	Guanajuato	125	894.71	15.0	13.3
	Guerrero	35	217.31	3.6	3.2
	Jalisco	265	1,832.80	30.7	27.3
	Michoacan	253	1,640.00	27.5	24.5
Subtotals		694	4,668.15	78.2	69.6
5 - Central Highlands	Hidalgo	5	43.21	0.7	0.6
	Mexico	7	59.28	1.0	0.9
	Mexico, D.F.	2	7.37	0.1	0.1
	Morelos	19	144.64	2.4	2.2
	Puebla	10	61.74	1.0	0.9
	Queretaro	5	39.84	0.7	0.6
	Tlaxcala	1	6.98	0.1	0.1
Subtotals		49	363.06	6.1	5.4
6 - Southern Mexico	Chiapas	2	10.49	0.2	0.2
	Oaxaca	6	44.96	0.8	0.7
	Veracruz	12	82.36	1.4	1.2
Subtotals		20	137.81	2.3	2.1
7 - Yucatan Peninsula	Belize[a]	0			
	Campeche	0			
	Quintana Roo	0			
	Tabasco	0			
	Yucatan	0			
Subtotals		0	0.00	0.0	0.0
Mexico[b]		882	5,971.63	100.0	89.0
8 - Guatemala		45	338.68	46.1	5.1
9 - El Salvador		30	204.10	27.8	3.0
10 - Honduras		12	67.78	9.2	1.0
11 - Nicaragua		13	103.91	14.1	1.5
12 - Costa Rica		2	20.06	2.7	0.3
Central America		102	734.53	100.0	11.0
Total Southern Zone[b]		984	6,706.16	--	100.0

[a]The Central American country of Belize is included in the Yucatan Peninsula for convenience.
[b]Excludes 20 direct recoveries in Mexico of unknown harvest location.

Table A-42. Weighted harvest distribution (%) of mourning doves in the Southern Zone by management unit tier. All doves - direct recoveries.

Southern harvest region	Contributing area (%)						United States
	West WMU	East WMU	West CMU	Mid CMU	East CMU	EMU	
1 - Northwest Coast	22.0	21.5	12.1	4.6	1.8	9.3	9.1
2 - Northern Highlands	2.5	6.7	2.8	0.8	2.7	0.0	2.0
3 - Northeast Coast	0.0	0.7	0.4	1.0	1.8	2.9	0.9
4 - Western Highlands	75.0	64.4	81.0	67.9	59.5	62.9	69.6
5 - Central Highlands	0.6	2.4	1.9	7.7	6.1	12.8	5.4
6 - Southern Mexico	0.0	0.0	0.0	2.6	6.1	7.3	2.1
7 - Yucatan Peninsula	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8 - Guatemala	0.0	3.6	1.6	6.1	13.8	0.7	5.1
9 - El Salvador	0.0	0.0	0.4	4.6	5.2	3.5	3.0
10 - Honduras	0.0	0.7	0.0	1.5	1.7	0.0	1.0
11 - Nicaragua	0.0	0.0	0.0	2.6	1.3	0.7	1.5
12 - Costa Rica	0.0	0.0	0.0	0.6	0.0	0.0	0.3
Totals	100.1	100.0	100.2	100.0	100.0	100.1	100.0
Sample size	120	55	189	445	143	32	984

Table A-43. Derivation of direct recoveries for immature mourning doves in the Central Management Unit and the Southern Zone, expressed as numbers of recoveries.

Contributing area	Central Management Unit harvest area											Southern harvest area	
	SD	WY	MO	KS	CO	NM	OK	AR	N.TX	S.TX	CMU total	Mexico	Central America
EMU													
Ohio									1	1	2		
Wisconsin	1		4	2	1		1	1	9	18	37	16	1
Illinois			7						1	6	14		
Indiana										3	3	3	
Kentucky			9								9		
Tennessee			1					7		1	9		
Alabama										1	1		
Mississippi			2	1				16	2	4	25	1	
Louisiana								18	35	40	93	5	
Subtotals	1	0	23	3	1	0	1	42	48	74	193	25	1
CMU													
Montana					20	10	1		3	2	36	38	
North Dakota	4			1	2	3	3		16	12	41	28	9
Minnesota	2			1		1	5	1	27	44	81	54	7
South Dakota	216		1	6	3	9	4		32	37	308	84	5
Wyoming		4			4	4			3		15	13	
Nebraska				2	2	4	1		13	12	34	50	1
Iowa				4	2	1	1	1	19	29	57	12	6
Missouri			334	9			5	2	9	18	377	14	1
Kansas				71		1	4		24	12	112	22	9
Colorado				1	56	10	2		9	1	79	50	1
New Mexico					1	75			10	1	87	44	1
Oklahoma					1	1	139		61	7	209	42	4
Arkansas			3	1			7	275	6	4	296	4	2
North Texas						1			356	42	399	47	5
South Texas									23	160	183	9	2
Subtotals	222	4	338	96	91	120	172	279	611	381	2,314	511	53
WMU													
Washington					1					2	3	26	
Oregon											0	11	
Idaho											0	3	1
Utah						2			1	1	4	14	
Nevada											0	9	
California					1				1		2	62	
Arizona						1			1	1	3	24	
Subtotals	0	0	0	0	2	3	0	0	3	4	12	149	1
Totals	223	4	361	99	94	123	173	321	662	459	2,519	685	55

Table A-44. Derivation of direct recoveries for adult mourning doves in the Central Management Unit and the Southern Zone, expressed as numbers of recoveries.

Contributing area	Central Management Unit harvest area											Southern harvest area	
	SD	WY	MO	KS	CO	NM	OK	AR	N.TX	S.TX	CMU total	Mexico	Central America
EMU													
Wisconsin			2						4	6	12	3	
Illinois			2	1					3	2	8	3	
Tennessee										1	1		
Mississippi								1		1	2		
Louisiana								1	12	20	33		2
Subtotals	0	0	4	1	0	0	0	2	19	30	56	6	2
CMU													
Montana					1					1	2	4	1
North Dakota			2	1		1	1		13	8	26	5	3
Minnesota	1						2		17	18	38	15	3
South Dakota	348			4	2	6	2		45	42	449	37	11
Wyoming						1					1	5	
Nebraska					1				23	24	48	26	9
Iowa			1				2	2	21	20	46	17	6
Missouri			151	2			1	2	4	5	165	2	3
Kansas			1	174	1	1	2		14	21	214	18	4
Colorado	1				90	12			8	1	112	24	1
New Mexico						55			5		60	10	
Oklahoma				1			40		7	6	54	5	
Arkansas			2				2	88	6	2	100		
North Texas							2		350	16	368	15	3
South Texas				1					3	127	131	1	
Subtotals	350	0	157	183	95	76	54	92	516	291	1,814	184	44
WMU											0	3	
Oregon											0	2	
Idaho											0	9	1
Utah									1		1	1	
Nevada											0	8	
California											0	4	
Arizona									1	0	1	27	1
Subtotals	0	0	0	0	0	0	0	0					
Totals	350	0	161	184	95	76	54	94	536	321	1,871	217	47

Table A-45. Derivation of direct recoveries for all mourning doves in the Central Management Unit and the Southern Zone, expressed as numbers of recoveries.

Contributing area	Central Management Unit harvest area											Southern harvest area	
	SD	WY	MO	KS	CO	NM	OK	AR	N.TX	S.TX	CMU total	Mexico	Central America
EMU													
Wisconsin	1		6	2	1		1	1	13	24	49	19	1
Illinois			9	1					4	8	22	3	
Indiana										3	3	3	
Ohio									1	1	2		
Kentucky			9								9		
Tennessee			1					7		2	10		
Alabama										1	1		
Mississippi			2	1				17	2	5	27	1	
Louisiana								19	47	60	126	5	2
Subtotals	1	0	27	4	1	0	1	44	67	104	249	31	3
CMU													
Montana					21	10	1		3	3	38	42	1
North Dakota	4		2	2	2	4	4		29	20	67	33	12
Minnesota	3			1		1	7	1	44	62	119	69	10
South Dakota	564		1	10	5	15	6		77	79	757	121	16
Wyoming		4			4	5			3		16	18	
Nebraska				2	3	4	1		36	36	82	76	10
Iowa			1	4	2	1	3	3	40	49	103	29	12
Missouri			485	11			6	4	13	23	542	16	4
Kansas			1	245	1	2	6		38	33	326	40	13
Colorado	1			1	146	22	2		17	2	191	74	2
New Mexico					1	130			15	1	147	54	1
Oklahoma				1	1	1	179		68	13	263	47	4
Arkansas			5	1			9	363	12	6	396	4	2
North Texas						1	2		706	58	767	62	8
South Texas				1					26	287	314	10	2
Subtotals	572	4	495	279	186	196	226	371	1,127	672	4,128	695	97
WMU													
Washington					1					2	3	26	
Oregon											0	14	
Idaho											0	5	1
Utah						2			1	1	4	23	1
Nevada									1		1	10	
California					1				1		2	70	
Arizona						1			1	1	3	28	
Subtotals	0	0	0	0	2	3	0	0	4	4	13	176	2
Totals	573	4	522	283	189	199	227	415	1,198	780	4,390	902	102

Table A-46. Derivation of indirect recoveries for immature mourning doves in the Central Management Unit and the Southern Zone, expressed as numbers of recoveries.

Contributing area	Central Management Unit harvest area												Southern harvest area	
	SD	WY	NE	MO	KS	CO	NM	OK	AR	N.TX	S.TX	CMU total	Mexico	Central America
EMU												0	1	
Massachusetts					1			1	3	6	6	17	7	
Wisconsin				1			1	2				3	1	
Illinois									1		1	3		
Indiana										1		1		
Virginia				1					2			3		
Tennessee												1		
South Carolina	1				1				5	3	2	12	1	1
Alabama				2					12	7	7	27	10	1
Mississippi				1					23	17	16	68		
Louisiana														
Subtotals	1	0	0	5	2	0	1	3						
CMU						9	5			9	2	25	27	1
Montana					3	1	1	3		15	18	42	37	6
North Dakota	1			1	1	1	1	1		14	23	43	46	5
Minnesota	1				3		2	4		47	32	211	60	16
South Dakota	122		1			1	3			2		8	7	7
Wyoming		2			6	3	6	1		25	12	116	50	7
Nebraska			63					3		14	27	48	14	1
Iowa				4				1	2	5	6	110	6	5
Missouri				94	2		1	1		15	11	96	20	1
Kansas				1	67		6			10	1	72	33	2
Colorado				1		54	63			17	2	83	36	7
New Mexico					6	1		51	2	49	20	130	32	1
Oklahoma				2				2	57	3		64		1
Arkansas				1	1	1	1	4	1	180	19	211	26	
North Texas	1	1	1					1	1	8	91	101	4	
South Texas														
Subtotals	125	3	65	105	89	71	90	72	63	413	264	1,360	398	60
WMU										2	1	3	9	
Washington												0	3	
Oregon							1					1	1	
Idaho												0	11	
Utah												0	7	
Nevada												0	32	1
California							1	2				3	14	
Arizona							1	3	0	0	2	1	7	77	1
Subtotals	0	0	0	0	0	0								
Totals	126	3	65	110	91	72	94	75	86	432	281	1,435	485	62

Table A-47. Derivation of indirect recoveries for adult mourning doves in the Central Management Unit and the Southern Zone, expressed as numbers of recoveries.

Contributing area	Central Management Unit harvest area												Southern harvest area	
	SD	WY	NE	MO	KS	CO	NM	OK	AR	N.TX	S.TX	CMU total	Mexico	Central America
EMU														
Michigan											1	1		
Wisconsin										5	8	13	3	3
Illinois				5						1	3	9		
Indiana								1				1		
Tennessee									3			3		
South Carolina	1											1		
Mississippi										2		2		
Louisiana									1	1	5	7	1	
Subtotals	1	0	0	5	0	0	0	1	4	9	17	37	4	3
CMU														
Montana						2				3		5	9	2
North Dakota					2		1	2		10	10	25	16	2
Minnesota				2	1				2	15	13	33	20	5
South Dakota	236		3	1		2	8	5		65	41	361	80	10
Wyoming		3				1				3		7	5	1
Nebraska	1		64		1	2	4	2		28	19	121	37	10
Iowa				3				2	1	21	28	55	25	7
Missouri				99	1			2	1	4	4	111	6	2
Kansas					125		1	3		22	8	159	27	3
Colorado	1					81	15			10	5	112	27	1
New Mexico						3	49			6		58	12	
Oklahoma								18		8	4	30	8	
Arkansas									31	3	1	35	1	1
North Texas			1		2	1	2	3		204	7	220	19	1
South Texas								1		4	109	114	3	2
Subtotals	238	3	68	105	132	92	80	38	35	406	249	1,446	295	47
WMU														
Washington												0	1	
Oregon												0		
Idaho												0	5	
Utah						1						1	12	
Nevada										1	1	2	6	
California							1					1	18	
Arizona												0	2	
Subtotals	0	0	0	0	0	1	1	0	0	1	1	4	44	0
Totals	239	3	68	110	132	93	81	39	39	416	267	1,487	343	50

Table A-48. Derivation of indirect recoveries for all mourning doves in the Central Management Unit and the Southern Zone, expressed as numbers of recoveries.

Contributing area	Central Management Unit harvest area												Southern harvest area	
	SD	WY	NE	MO	KS	CO	NM	OK	AR	N.TX	S.TX	CMU total	Mexico	Central America
EMU												0	1	
Massachusetts											1	1		
Michigan					1			1	3	11	14	30	10	3
Wisconsin				6				2		1	3	12	1	
Illinois							1	1	1		1	4		
Indiana										1		1		
Virginia				1					5			6		
Tennessee												2		
South Carolina	2				1							1		
Alabama				2					5	5	2	14		
Mississippi				1					13	8	12	34	2	1
Louisiana													14	4
Subtotals	2	0	0	10	2	0	1	4	27	26	33	105		
CMU						11	5			12	2	30	36	3
Montana					5	1	2	5		25	28	67	53	8
North Dakota	1			3	2		1	1	2	29	36	75	66	10
Minnesota	1			1	3	3	10	9		112	73	573	139	26
South Dakota	358		4			2	3			5		15	12	1
Wyoming		5			7	5	10	3		53	31	237	86	17
Nebraska	1		127	7				5	1	35	55	103	39	14
Iowa				193	3			3	3	9	10	221	12	3
Missouri				1	192		2	4		37	19	255	47	8
Kansas				1		135	21			20	6	184	60	2
Colorado	1					4	112			23	2	141	48	2
New Mexico				1	6		1	69	2	57	24	160	40	7
Oklahoma				2				2	88	6	1	99	1	2
Arkansas				1	3	2	3	7	1	384	26	431	45	2
North Texas	1	1	2					2	1	12	200	215	7	2
South Texas													691	107
Subtotals	363	6	133	210	221	163	170	110	98	819	513	2,806		
WMU										2	1	3	10	
Washington												0	3	
Oregon							1					1	6	
Idaho						1						1	22	
Utah										1	1	2	13	
Nevada							1					1	50	1
California						1	2					3	15	
Arizona													119	1
Subtotals	0	0	0	0	0	2	4	0	0	3	2	11		
Totals	365	6	133	220	223	165	175	114	125	848	548	2,922	824	112

Table A-49. Derivation of direct recoveries for immature mourning doves in Southern Zone regions, expressed as numbers of recoveries.

Banding area	Southern harvest region															Total Southern Zone
	Mexico									Central America						
	Unknown	1	2	3	4	5	6	7	Total	8	9	10	11	12	Total	
EMU																
Wisconsin	1	1			12	2			16		1				1	17
Indiana				1	2				3						0	3
Mississippi							1		1						0	1
Louisiana	1				4				5						0	5
Subtotals	2	1	0	1	18	2	1	0	25	0	1	0	0	0	1	26
CMU																
Montana	1	2			35				38						0	38
North Dakota		1			22	4	1		28	4	2	1	2		9	37
Minnesota		4	3	1	43	1	2		54	2	3	1	1		7	61
South Dakota	2	3	1	1	72	3	2		84	1	3		1		5	89
Wyoming		4			9				13						0	13
Nebraska		1			46	2	1		50		1				1	51
Iowa	2				10				12	2	2	1	1		6	18
Missouri	1		1	1	9	1	1		14		1				1	15
Kansas	1				20	1			22	3	3	1	2		9	31
Colorado		6	3	1	38	2			50	1					1	51
New Mexico	1	5	2		36				44	1					1	45
Oklahoma	3	3			29	5	2		42	2	1			1	4	46
Arkansas					4				4	2					2	6
North Texas		2		1	38	4	2		47	3		2			5	52
South Texas					6	3			9	1	1				2	11
Subtotals	11	31	10	5	417	26	11	0	511	22	17	6	7	1	53	564
WMU																
Washington		2			23	1			26						0	26
Oregon		2			9				11						0	11
Idaho		1			2				3	1					1	4
Utah	1	1	1		11				14						0	14
Nevada		1			8				9						0	9
California		15	1		46				62						0	62
Arizona	2	4			17	1			24						0	24
Subtotals	3	26	2	0	116	2	0	0	149	1	0	0	0	0	1	150
Totals	16	58	12	6	551	30	12	0	685	23	18	6	7	1	55	740

Table A-50. Derivation of direct recoveries for adult mourning doves in Southern Zone regions, expressed as numbers of recoveries.

Banding area	Southern harvest region														Total Southern Zone
	Mexico								Central America						
	Unknown	1	2	3	4	5	6	7	Total	8	9	10	11	12	Total	
EMU																
Wisconsin					2		1		3						0	3
Illinois		1			1	1			3						0	3
Louisiana									0	1			1		2	2
Subtotals	0	1	0	0	3	1	1	0	6	1	0	0	1	0	2	8
CMU																
Montana		1			3				4	1					1	5
North Dakota		1		1	3				5	1	1		1		3	8
Minnesota					11	4			15	2		1			3	18
South Dakota	2	5	1	1	25	2	1		37	3	3	3	1	1	11	48
Wyoming					5				5						0	5
Nebraska		1	2	1	17	4	1		26	4	4		1		9	35
Iowa					11	3	3		17	5	1				6	23
Missouri					1		1		2	3					3	5
Kansas		3			12	2	1		18	2			2		4	22
Colorado	1	2			19	2			24		1				1	25
New Mexico		2	2		5	1			10						0	10
Oklahoma					5				5						0	5
Arkansas									0						0	0
North Texas	1		1	1	12				15		2	1			3	18
South Texas					1				1						0	1
Subtotals	4	15	6	4	130	18	7	0	184	21	12	5	5	1	44	228
WMU																
Washington									0						0	0
Oregon		1	1		1				3						0	3
Idaho			1		1				2						0	2
Utah		4		1	4				9			1			1	10
Nevada		1							1						0	1
California		5			3				8						0	8
Arizona		2	1		1				4						0	4
Subtotals	0	13	3	1	10	0	0	0	27	0	0	1	0	0	1	28
Totals	4	29	9	5	143	19	8	0	217	22	12	6	6	1	47	264

Table A-51. Derivation of direct recoveries for all mourning doves in Southern Zone regions, expressed as numbers of recoveries.

Banding area	Southern harvest region														
	Mexico									Central America					
	Unknown	1	2	3	4	5	6	7	Total	8	9	10	11	12	Total	Total Southern Zone
EMU																
Wisconsin	1	1			14	2	1		19		1				1	20
Illinois		1			1	1			3						0	3
Indiana				1	2				3						0	3
Mississippi							1		1						0	1
Louisiana	1				4				5	1			1		2	7
Subtotals	2	2	0	1	21	3	2	0	31	1	1	0	1	0	3	34
CMU																
Montana	1	3			38				42	1					1	43
North Dakota		2		1	25	4	1		33	5	3	1	3		12	45
Minnesota		4	3	1	54	5	2		69	4	3	2	1		10	79
South Dakota	4	8	2	2	97	5	3		121	4	6	3	2	1	16	137
Wyoming		4			14				18						0	18
Nebraska		2	2	1	63	6	2		76	4	5		1		10	86
Iowa	2				21	3	3		29	7	3	1	1		12	41
Missouri	1		1	1	10	1	2		16	3	1				4	20
Kansas	1	3			32	3	1		40	5	3	1	4		13	53
Colorado	1	8	3	1	57	4			74	1	1				2	76
New Mexico	1	7	4		41	1			54	1					1	55
Oklahoma	3	3			34	5	2		47	2	1			1	4	51
Arkansas					4				4	2					2	6
North Texas	1	2	1	2	50	4	2		62	3	2	3			8	70
South Texas					7	3			10	1	1				2	12
Subtotals	15	46	16	9	547	44	18	0	695	43	29	11	12	2	97	792
WMU																
Washington		2			23	1			26						0	26
Oregon		3	1		10				14						0	14
Idaho		1	1		3				5	1					1	6
Utah	1	5	1	1	15				23			1			1	24
Nevada		2			8				10						0	10
California		20	1		49				70						0	70
Arizona	2	6	1		18	1			28						0	28
Subtotals	3	39	5	1	126	2	0	0	176	1	0	1	0	0	2	178
Totals	20	87	21	11	694	49	20	0	902	45	30	12	13	2	102	1,004

Table A-52. Derivation of indirect recoveries for immature mourning doves in Southern Zone regions, expressed as numbers of recoveries.

Banding area	Southern harvest region														Total Southern Zone
	Mexico									Central America					
	Unknown	1	2	3	4	5	6	7	Total	8	9	10	11	12	Total	
EMU																
Massachusetts					1				1						0	1
Wisconsin	2	1			3	1			7						0	7
Illinois					1				1						0	1
Indiana									0						0	0
Mississippi									0						0	0
Louisiana					1				1				1		1	2
Subtotals	2	1	0	0	6	1	0	0	10	0	0	0	1	0	1	11
CMU																
Montana	1	2	4		19	1			27	1					1	28
North Dakota	3	3	1		25	5			37	2		2	2		6	43
Minnesota	1		1	1	35	6	2		46	2		2		1	5	51
South Dakota	4		2	2	49	3			60	4	5	4	1	1	15	75
Wyoming					7				7						0	7
Nebraska	5	2	4		35	3	1		50	4	2		1		7	57
Iowa	1				10	3			14	3	2	1			6	20
Missouri			1		5				6		1				1	7
Kansas	2	2	1	2	12		1		20	1	4				5	25
Colorado	7	3		1	21	1			33		1				1	34
New Mexico	3	4	2		22	4	1		36	2					2	38
Oklahoma	3	2		3	20	2	2		32	1	4	1	1		7	39
Arkansas									0	1					1	1
North Texas	4	1	1		18	2			26		1				1	27
South Texas				1	3				4						0	4
Subtotals	34	19	17	10	281	30	7	0	398	21	20	10	5	2	58	456
WMU																
Washington	1	3	1		4				9						0	9
Oregon					3				3						0	3
Idaho					1				1						0	1
Utah	1	5			4	1			11						0	11
Nevada	2	3			2				7						0	7
California	1	9	2	1	17	2			32	1					1	33
Arizona	1	2	3		8				14						0	14
Subtotals	6	22	6	1	39	3	0	0	77	1	0	0	0	0	1	78
Totals	42	42	23	11	326	34	7	0	485	22	20	10	6	2	60	545

Table A-53. Derivation of indirect recoveries for adult mourning doves in Southern Zone regions, expressed as numbers of recoveries.

Banding area	Southern harvest region															Total Southern Zone
	Mexico									Central America						
	Unknown	1	2	3	4	5	6	7	Total	8	9	10	11	12	Total	
EMU																
Massachusetts									0						0	0
Wisconsin					2	1			3		2		1		3	6
Illinois									0						0	0
Indiana									0						0	0
Mississippi									0						0	0
Louisiana					1				1						0	1
Subtotals	0	0	0	0	3	1	0	0	4	0	2	0	1	0	3	7
CMU																
Montana	1	4			4				9			2			2	11
North Dakota	1	1			12	2			16	2					2	18
Minnesota			1	2	10	3	4		20	3	2				5	25
South Dakota	5	8	6	2	50	8	1		80	4	5		1		10	90
Wyoming		1			4				5	1					1	6
Nebraska	1	5	1		29	1			37	3	3	3	1		10	47
Iowa	2	2			14	5	2		25	5	1		1		7	32
Missouri		1		1	2	2			6		1	1			2	8
Kansas				2	22	2	1		27	3					3	30
Colorado	1	7	1		17	1			27				1		1	28
New Mexico	1	6	3		2				12						0	12
Oklahoma	1			1	6				8						0	8
Arkansas					1				1		1				1	2
North Texas	2	2	1		12	2			19		1				1	20
South Texas				1	2				3		2				2	5
Subtotals	15	37	13	9	187	26	8	0	295	21	16	6	4	0	47	342
WMU																
Washington		1							1						0	1
Oregon									0						0	0
Idaho		2	2		1				5						0	5
Utah		7	1		4				12						0	12
Nevada	1	2	1	1	1				6						0	6
California	1	7	2		8				18						0	18
Arizona		2							2						0	2
Subtotals	2	21	6	1	14	0	0	0	44	0	0	0	0	0	0	44
Totals	17	58	19	10	204	27	8	0	343	21	18	6	5	0	50	393

Table A-54. Derivation of indirect recoveries for all mourning doves in Southern Zone regions, expressed as numbers of recoveries.

Banding area	Southern harvest region														Total Southern Zone
	Mexico									Central America					
	Unknown	1	2	3	4	5	6	7	Total	8	9	10	11	12	Total	
EMU																
Massachusetts					1				1						0	1
Wisconsin	2	1			5	2			10		2		1		3	13
Illinois					1				1						0	1
Indiana									0						0	0
Mississippi									0						0	0
Louisiana					2				2				1		1	3
Subtotals	2	1	0	0	9	2	0	0	14	0	2	0	2	0	4	18
CMU																
Montana	2	6	4		23	1			36	1		2			3	39
North Dakota	4	4	1		37	7			53	4		2	2		8	61
Minnesota	1		2	3	45	9	6		66	5	2	2		1	10	76
South Dakota	9	8	8	4	99	11	1		140	8	10	5	2	1	26	166
Wyoming		1			11				12	1					1	13
Nebraska	6	7	5		64	4	1		87	7	5	3	2		17	104
Iowa	3	2			24	8	2		39	8	4	1	1		14	53
Missouri		1	1	1	7	2			12		2	1			3	15
Kansas	2	2	1	4	34	2	2		47	4	4				8	55
Colorado	8	10	1	1	38	2			60		1		1		2	62
New Mexico	4	10	5		24	4	1		48	2					2	50
Oklahoma	4	2		4	26	2	2		40	1	4	1	1		7	47
Arkansas					1				1	1	1				2	3
North Texas	6	3	2		30	4			45		2				2	47
South Texas		1		1	5				7		2				2	9
Subtotals	49	57	30	18	468	56	15	0	693	42	37	17	9	2	107	800
WMU																
Washington	1	4	1		4				10						0	10
Oregon					3				3						0	3
Idaho		2	2		2				6						0	6
Utah	1	12	1		8	1			23						0	23
Nevada	3	5	1	1	3				13						0	13
California	2	16	4		26	2			50	1					1	51
Arizona	1	4	3		8				16						0	16
Subtotals	8	43	12	1	54	3	0	0	121	1	0	0	0	0	1	122
Totals	59	101	42	19	531	61	15	0	828	43	39	17	11	2	112	940

Table A-55. Derivation ( ) of the mourning dove harvest[a] in the Central Management Unit, Mexico, and Central America. Immatures - direct recoveries.

Contributing area	Central Management Unit harvest area (%)											Southern harvest area (%)	
	SD	WY	MO	KS	CO	NM	OK	AR	N.TX	S.TX	CMU total	Mexico	Central America
EMU													
Wisconsin	0.3		0.4	0.3	0.5		0.1	0.2	0.5	1.5	0.6	0.9	0.5
Illinois			1.5						0.1	1.0	0.4		
Indiana										0.2	Tr	0.1	
Ohio									0.1	0.1	Tr		
Kentucky			2.8								0.4		
Tennessee			0.1					0.6		Tr	0.1		
Alabama										Tr	Tr		
Mississippi			0.2	0.2				2.6	0.1	0.4	0.4	0.1	
Louisiana								0.5	0.3	0.6	0.2	Tr	
Subtotals	0.3	0.0	5.0	0.5	0.5	0.0	0.1	3.9	1.0	3.8	2.1	1.1	0.5
CMU													
Montana					23.7	9.3	0.3		0.3	0.4	1.1	4.7	
North Dakota	3.1			0.5	3.3	3.8	1.2		2.4	3.0	1.8	4.7	14.4
Minnesota	0.4			0.1		0.4	0.6	0.1	1.1	3.1	1.0	2.5	3.1
South Dakota	96.2		0.2	1.8	2.8	6.6	1.0		2.8	5.2	7.6	8.1	4.6
Wyoming		100.0			7.2	5.6			0.5		0.7	2.4	
Nebraska				1.3	4.1	6.5	0.5		2.5	3.8	1.9	10.7	2.0
Iowa				1.6	2.5	1.0	0.3	0.4	2.3	5.6	1.9	1.6	7.5
Missouri			94.1	4.0			1.8	0.8	1.2	3.9	14.4	2.1	1.4
Kansas				89.4		3.1	4.1		9.0	7.3	11.9	9.1	35.5
Colorado				0.3	51.2	7.2	0.5		0.8	0.1	1.9	4.7	0.9
New Mexico					0.8	48.9			0.8	0.1	1.9	3.8	0.8
Oklahoma					2.5	1.9	87.4		14.0	2.6	13.7	10.7	9.7
Arkansas			0.7	0.4			2.2	94.8	0.7	0.7	9.6	0.5	2.4
North Texas						1.3			55.9	10.8	17.9	8.2	8.3
South Texas									4.3	48.7	9.9	1.9	3.9
Subtotals	99.7	100.0	95.0	99.5	98.0	95.8	99.9	96.1	98.6	95.3	97.4	75.7	94.7
WMU													
Washington					0.7					0.2	0.1	1.8	
Oregon											0.0	3.1	
Idaho											0.0	1.5	4.8
Utah						1.9			0.1	0.2	0.1	1.7	
Nevada											0.0	3.1	
California					0.7				0.1		Tr	4.8	
Arizona						2.3			0.3	0.4	0.2	7.2	
Subtotals	0.0	0.0	0.0	0.0	1.4	4.2	0.0	0.0	0.5	0.8	0.5	23.2	4.8
Totals	100.0	100.0	100.0	100.0	99.9	100.0	100.0	100.0	100.1	99.9	100.0	100.0	100.0

[a]Weighted.

Table A-56. Derivation (%) of the mourning dove harvest[a] in the Central Management Unit, Mexico, and Central America. Adults - direct recoveries.

Contributing area	Central Management Unit harvest area (%)											Southern harvest area (%)	
	SD	WY	MO	KS	CO	NM	OK	AR	N.TX	S.TX	CMU total	Mexico	Central America
EMU													
Wisconsin			0.6						0.5	1.2	0.4	0.9	
Illinois			0.8	0.3					0.4	0.5	0.4	1.2	
Tennessee										0.1	Tr		
Mississippi								0.8		0.3	0.1		
Louisiana								0.2	0.4	1.0	0.3		0.9
Subtotals	0.0	0.0	1.3	0.3	0.0	0.0	0.0	1.0	1.3	3.1	1.2	2.1	0.9
CMU													
Montana					4.9					0.6	0.2	4.0	5.6
North Dakota			1.4	0.6		3.1	0.7		5.4	6.8	2.2	3.6	12.0
Minnesota	0.4						0.4		1.8	2.8	1.1	3.6	4.0
South Dakota	99.3			0.6	1.8	4.8	0.3		3.6	5.0	9.5	6.8	11.2
Wyoming						3.4					0.1	3.9	
Nebraska					2.1				4.5	6.9	2.5	11.6	22.2
Iowa			0.2				0.5	1.1	2.4	3.3	1.4	4.4	8.6
Missouri			95.4	1.1			0.6	2.8	1.2	2.2	12.7	1.3	11.1
Kansas			0.7	95.1	3.4	3.0	1.3		4.3	9.4	17.1	12.5	15.4
Colorado	0.3				87.8	10.4			0.7	0.1	2.5	4.8	1.1
New Mexico						75.3			0.7		2.2	3.2	
Oklahoma				2.0			94.4		7.8	9.8	15.7	12.7	
Arkansas			1.0				0.9	95.1	1.3	0.7	5.8		
North Texas							0.8		63.7	4.3	17.4	6.2	6.9
South Texas				0.4					0.7	45.1	8.4	0.6	
Subtotals	100.0	0.0	98.7	99.7	100.0	100.0	100.0	99.0	98.3	96.9	98.7	79.2	98.0
WMU													
Washington											0.0		
Oregon											0.0	4.7	
Idaho											0.0	2.8	
Utah											0.0	1.9	1.2
Nevada									0.4		0.1	1.0	
California											0.0	4.1	
Arizona											0.0	4.2	
Subtotals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.1	18.7	1.2
Totals	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.1

[a]Weighted.

Table A-57. Derivation (%) of the mourning dove harvest[a] in the Central Management Unit, Mexico, and Central America. All doves - direct recoveries.

Contributing area	Central Management Unit harvest area (%)											Southern harvest area (%)	
	SD	WY	MO	KS	CO	NM	OK	AR	N.TX	S.TX	CMU total	Mexico	Central America
EMU													
Wisconsin	0.2		0.5	0.2	0.4		0.1	0.1	0.5	1.5	0.5	1.0	0.4
Illinois			1.2	0.1					0.3	0.8	0.4	0.3	
Indiana										0.2	Tr	0.1	
Ohio									Tr	0.1	Tr		
Kentucky			2.1								0.3		
Tennessee			Tr					0.6		0.1	0.1		
Alabama										Tr	Tr		
Mississippi			0.2	0.1				2.4	0.1	0.3	0.3	0.1	
Louisiana								0.5	0.3	0.7	0.2	Tr	0.2
Subtotals	0.2	0.0	4.0	0.4	0.4	0.0	0.1	3.6	1.2	3.6	1.8	1.5	0.6
CMU													
Montana					19.2	8.1	0.2		0.3	0.4	0.9	5.3	1.0
North Dakota	1.8		0.4	0.5	2.1	3.7	1.1		3.0	3.4	1.9	4.7	14.2
Minnesota	0.4			0.1		0.3	0.6	0.1	1.4	3.1	1.0	2.9	3.5
South Dakota	97.5		0.1	1.0	2.1	5.4	0.6		3.1	5.2	8.4	6.8	7.5
Wyoming		100.0			4.6	5.0			0.3		0.5	2.8	
Nebraska				0.4	2.9	3.4	0.2		3.4	5.6	2.1	10.0	10.9
Iowa			0.1	0.5	1.1	0.5	0.4	0.6	2.3	4.5	1.6	2.3	7.8
Missouri			94.3	2.4			1.4	1.3	1.2	3.5	13.7	2.0	4.2
Kansas			0.3	93.7	1.6	2.9	2.5		6.2	8.7	14.5	9.0	24.3
Colorado	0.2			0.1	62.5	8.3	0.2		0.7	0.1	2.2	4.3	1.0
New Mexico					0.5	57.5			0.7	0.1	2.0	3.7	0.6
Oklahoma				0.5	2.0	1.8	90.4		13.4	4.2	14.2	12.8	9.1
Arkansas			0.8	0.2			1.7	94.4	0.9	0.7	8.2	0.4	1.7
North Texas						0.7	0.4		58.5	7.8	17.4	7.1	7.6
South Texas				0.2					2.7	48.5	9.1	1.4	2.4
Subtotals	99.8	100.0	96.0	99.6	98.5	97.6	99.9	96.4	98.3	95.8	97.8	75.4	95.9
WMU													
Washington					0.6					0.2	Tr	2.0	2.9
Oregon											0.0	3.6	0.6
Idaho											0.0	1.8	
Utah						0.9			Tr	0.1	0.1	1.5	
Nevada									0.2		Tr	2.4	
California					0.5				0.1		Tr	5.2	
Arizona						1.5			0.2	0.3	0.1	6.6	
Subtotals	0.0	0.0	0.0	0.0	1.1	2.4	0.0	0.0	0.5	0.5	0.3	23.1	3.5
Totals	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.9	100.0	100.0

[a]Weighted.

Table A-58. Derivation (%) of the mourning dove harvest[a] in the Southern Zone by harvest and contributing areas. Immatures - direct recoveries.

Contributing area	Southern harvest region (%)														Total Southern Zone
	Mexico								Central America						
	1	2	3	4	5	6	7	Total	8	9	10	11	12	Total	
EMU	0.7	0.0	7.2	1.0	2.2	3.4	0.0	1.1	0.0	1.8	0.0	0.0	0.0	0.5	1.1
East-CMU	2.3	27.8	32.3	6.4	3.7	14.0	0.0	6.5	13.4	17.5	16.1	12.4	0.0	14.5	7.2
Mid-CMU	22.2	9.2	44.8	54.7	83.5	82.6	0.0	53.5	71.5	80.7	83.9	87.6	100.0	78.5	55.9
West-CMU	24.7	43.8	15.7	15.7	3.6	0.0	0.0	15.8	4.0	0.0	0.0	0.0	0.0	1.7	14.4
East-WMU	22.8	11.8	0.0	9.3	5.7	0.0	0.0	10.0	11.1	0.0	0.0	0.0	0.0	4.8	9.5
West-WMU	27.2	7.4	0.0	12.9	1.3	0.0	0.0	13.1	0.0	0.0	0.0	0.0	0.0	0.0	11.8
Totals	99.9	100.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9
Sample size	58	12	6	551	30	12	0	669[b]	23	18	6	7	1	55	724

[a]Weighted.
[b]Excludes 16 recoveries of unknown location in Mexico.

Table A-59. Derivation (%) of the mourning dove harvest[a] in the Southern Zone by harvest and contributing areas. Adults - direct recoveries.

Contributing area	Southern harvest region (%)														
	Mexico								Central America						Total Southern Zone
	1	2	3	4	5	6	7	Total	8	9	10	11	12	Total	
EMU	2.7	0.0	0.0	1.5	6.2	10.0	0.0	2.1	0.9	0.0	0.0	2.8	0.0	0.9	1.9
East-CMU	0.0	0.0	0.0	9.2	27.2	47.0	0.0	9.4	40.6	6.0	17.0	0.0	0.0	23.7	11.6
Mid-CMU	28.4	24.3	89.4	61.2	55.3	43.0	0.0	53.6	47.7	89.4	68.2	97.2	100.0	67.6	55.8
West-CMU	14.0	10.4	0.0	18.5	11.3	0.0	0.0	15.9	10.8	4.7	0.0	0.0	0.0	6.7	14.5
East-WMU	19.9	39.5	10.6	4.9	0.0	0.0	0.0	8.9	0.0	0.0	14.8	0.0	0.0	1.2	7.7
West-WMU	35.0	25.8	0.0	4.7	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	8.4
Totals	100.0	100.0	100.0	100.0	100.0	100.0	0.0	99.9	100.0	100.1	100.0	100.0	100.0	100.1	99.9
Sample size	29	9	5	143	19	8	0	213[b]	22	12	6	6	1	47	260

[a]Weighted.
[b]Excludes 4 recoveries of unknown location in Mexico.

Table A-60. Derivation (%) of the mourning dove harvest[a] in the Southern Zone by harvest and contributing areas. All doves - direct recoveries.

Contributing area	Southern harvest region (%)														
	Mexico								Central America						Total Southern Zone
	1	2	3	4	5	6	7	Total	8	9	10	11	12	Total	
EMU	1.4	0.0	4.5	1.2	3.2	4.9	0.0	1.5	0.2	1.6	0.0	0.6	0.0	0.6	1.4
East-CMU	1.7	11.7	17.8	7.4	9.7	25.5	0.0	7.5	23.6	14.7	14.7	7.1	0.0	17.3	8.6
Mid-CMU	27.2	22.4	64.4	52.9	76.8	69.7	0.0	51.6	65.3	82.0	79.2	92.3	100.0	76.0	54.2
West-CMU	19.5	20.6	6.2	17.2	5.1	0.0	0.0	16.3	4.6	1.8	0.0	0.0	0.0	2.6	14.8
East-WMU	21.1	30.1	7.1	8.3	4.0	0.0	0.0	9.6	6.4	0.0	6.1	0.0	0.0	3.5	8.9
West-WMU	29.1	15.2	0.0	13.0	1.3	0.0	0.0	13.6	0.0	0.0	0.0	0.0	0.0	0.0	12.1
Totals	100.0	100.0	100.0	100.0	100.1	100.1	0.0	100.1	100.1	100.1	100.0	100.0	100.0	100.0	100.0
Sample size	87	21	11	694	49	20	0	882[b]	45	30	12	13	2	102	984

[a]Weighted.
[b]Excludes 20 recoveries of unknown location in Mexico.

Table A-61. Weighted percentage of mourning dove direct recoveries that originated within State for Central Management Unit hunting States[a].

CMU recovery area	Weighted in-State recovery (%)		
	Adult males	Adult females	Immatures
South Dakota	99.5(251)	99.1 (91)	96.2(223)
Missouri	96.1(111)	93.2 (50)	94.1(361)
Kansas	97.9(107)	94.8 (74)	89.4 (99)
Colorado	88.1 (59)	87.5 (36)	51.2 (94)
New Mexico	79.1 (55)	60.4 (20)	48.9(123)
Oklahoma	94.1 (32)	92.0 (15)	87.4(173)
Arkansas	96.5 (55)	94.3 (37)	94.8(321)
North Texas	69.2(374)	52.2(139)	55.9(662)
South Texas	43.3(204)	50.3 (92)	48.7(459)

[a]Example: 69% of banded adult doves recovered in N.TX were banded in N.TX. Figures in parentheses represent total numbers of recoveries in States of recovery.

Table A-62. Chronological derivation of harvest of all mourning doves in North Texas. Weighted direct recoveries, 1967-75.

State or area contributing to harvest	Number of recoveries				Contribution to harvest (%)			
	Sept. 1-10	Sept. 11-20	Sept. 21-30	Oct. 1-31	Sept. 1-10	Sept. 11-20	Sept. 21-30	Oct. 1-31
EMU	27	16	6	13	0.6	1.3	1.2	2.9
CMU								
Montana		3				2.0		
North Dakota	1	5	8	14	0.2	3.8	7.7	9.2
Minnesota	2	6	7	25	0.1	1.3	2.0	4.9
South Dakota	9	7	24	35	0.7	2.1	9.1	9.1
Wyoming	2	1			0.4	0.8		
Nebraska	5	2	10	16	0.9	1.4	8.9	9.7
Iowa	6	2	5	25	0.7	0.8	2.6	9.0
Missouri	2	6		4	0.4	4.0		2.4
Kansas	11	11	6	10	3.4	13.0	9.1	10.4
Colorado	9	2	5	1	0.7	0.6	2.0	0.3
New Mexico	6	3	2	3	0.6	1.1	0.9	1.0
Oklahoma	41	6	8	8	15.5	8.6	14.7	10.0
Arkansas	5	2	2	2	0.7	1.1	1.4	1.0
North Texas	454	94	45	51	72.1	56.6	34.8	26.9
South Texas	15	2	4	4	3.0	1.5	3.9	2.7
Subtotals	568	152	126	198	99.4	98.7	97.2	96.5
WMU	0	0	1	2	0.0	0.0	1.6	0.7
Totals	595	168	133	213	100.0	100.0	100.0	100.1

Table A-63. Chronological derivation of harvest of immature mourning doves in North Texas. Weighted direct recoveries, 1967-75.

State or area contributing to harvest	Number of recoveries				Contribution to harvest (%)			
	Sept. 1-10	Sept. 11-20	Sept. 21-30	Oct. 1-31	Sept. 1-10	Sept. 11-20	Sept. 21-30	Oct. 1-31
EMU	22	12	2	9	0.5	1.0	0.6	2.9
CMU								
Montana		3				2.3		
North Dakota		2	4	10		2.1	6.1	10.3
Minnesota	2	5	5	13	0.2	1.5	2.2	3.7
South Dakota	7	2	10	12	1.1	1.2	8.8	7.0
Wyoming	2	1			0.6	1.2		
Nebraska	2		3	7	0.7		5.9	9.1
Iowa		2	3	12		1.6	3.6	9.6
Missouri	2	2		4	0.5	1.8		3.6
Kansas	10	6	4	4	6.9	15.4	15.1	10.1
Colorado	6		3		0.9		2.6	
New Mexico	4	2	1	2	0.6	1.1	0.8	1.0
Oklahoma	36	6	6	8	15.2	9.5	14.0	12.4
Arkansas	2	2		1	0.4	1.6		0.8
North Texas	235	53	19	23	67.9	57.2	30.1	24.4
South Texas	13	2	4	3	4.5	2.6	7.5	3.8
Subtotals	321	88	62	99	99.5	99.0	96.6	95.9
WMU	0	0	1	2	0.0	0.0	2.7	1.2
Totals	343	100	65	110	100.0	100.0	99.9	100.0

Table A-64. Chronological derivation of harvest of adult mourning doves in North Texas. Weighted direct recoveries, 1967-75.

State or area contributing to harvest	Number of recoveries				Contribution to harvest (%)			
	Sept. 1-10	Sept. 11-20	Sept. 21-30	Oct. 1-31	Sept. 1-10	Sept. 11-20	Sept. 21-30	Oct. 1-31
EMU	5	4	4	4	0.6	1.9	2.2	3.0
CMU								
Montana								
North Dakota	1	3	4	4	0.6	7.6	9.9	8.1
Minnesota		1	2	12		0.8	1.7	8.1
South Dakota	2	5	14	23	0.3	3.2	8.8	11.8
Wyoming								
Nebraska	3	2	7	9	1.2	3.1	10.7	11.2
Iowa	6		2	13	1.4		1.8	9.4
Missouri		4				9.4		
Kansas	1	5	2	6	0.6	12.2	4.8	11.6
Colorado	3	2	2	1	0.5	1.4	1.4	0.6
New Mexico	2	1	1	1	0.6	1.1	1.1	0.9
Oklahoma	5		2		11.3		17.4	
Arkansas	3		2	1	1.4		3.5	1.4
North Texas	219	41	26	28	80.5	59.3	36.8	32.3
South Texas	2			1	1.0			1.5
Subtotals	247	64	64	99	99.4	98.1	97.8	97.0
WMU	0	0	0	0	0.0	0.0	0.0	0.0
Totals	252	68	68	103	100.0	100.0	100.0	100.0

Table A-65. Chronological derivation of harvest of all mourning doves in South Texas. Weighted direct recoveries, 1967-75.

State or area contributing to harvest	Number of recoveries				Contribution to harvest (%)			
	Sept. 1-30	Oct. 1-31	Nov. 1-30	Jan. 1-31	Sept. 1-30	Oct. 1-31	Nov. 1-30	Jan. 1-31
EMU	37	47	12	3	2.6	4.4	5.1	1.7
CMU								
Montana	2	1			0.7	0.3		
North Dakota	3	10	4	1	1.3	3.7	8.8	3.3
Minnesota	7	42	8	3	0.9	4.6	5.2	3.0
South Dakota	17	52	7	3	2.9	7.5	6.1	3.9
Wyoming								
Nebraska	7	25	2	1	2.7	8.4	4.0	3.0
Iowa	9	33	4	2	2.1	6.6	4.8	3.6
Missouri	3	16	3		1.1	5.2	5.9	
Kansas	5	23	1	3	3.3	13.2	3.5	15.6
Colorado	1			1	0.2			1.4
New Mexico		1				0.2		
Oklahoma	3	7	3		2.4	4.9	12.6	
Arkansas		5		1		1.3		2.4
North Texas	29	24	3	2	9.9	7.0	5.3	5.3
South Texas	163	86	17	17	69.8	31.7	37.7	56.7
Subtotals	249	325	52	34	97.4	94.6	93.9	98.3
WMU	0	3	1	0	0.0	1.0	1.0	0.0
Totals	286	375	65	37	100.0	100.0	100.0	100.0

Table A-66. Chronological derivation of harvest of immature mourning doves in South Texas. Weighted direct recoveries, 1967-75.

State or area contributing to harvest	Number of recoveries				Contribution to harvest (%)			
	Sept. 1-30	Oct. 1-31	Nov. 1-30	Jan. 1-31	Sept. 1-30	Oct. 1-31	Nov. 1-30	Jan. 1-31
EMU	26	34	9	2	2.1	5.3	5.7	4.7
CMU								
Montana	1	1			0.4	0.4		
North Dakota	3	5	2	1	1.6	2.9	7.2	9.6
Minnesota	5	29	7	1	0.8	4.7	7.1	2.7
South Dakota	11	24	2		3.4	7.9	4.1	
Wyoming								
Nebraska	2	10			1.4	7.3		
Iowa	9	17	3		3.8	7.7	8.5	
Missouri	1	13	3		0.5	6.6	9.5	
Kansas	3	9			4.0	12.8		
Colorado	1				0.3			
New Mexico		1				0.3		
Oklahoma	3	2	2		2.4	1.8	10.9	
Arkansas		4				1.7		
North Texas	24	18			13.3	10.7		
South Texas	100	40	10	7	66.1	28.4	44.3	83.0
Subtotals	163	173	29	9	97.9	93.2	91.6	95.3
WMU	0	3	1	0	0.0	1.5	2.6	0.0
Totals	189	210	39	11	100.0	100.0	99.9	100.0

Table A-67. Chronological derivation of harvest of adult mourning doves in South Texas. Weighted direct recoveries, 1967-75.

State or area contributing to harvest	Number of recoveries				Contribution to harvest (%)			
	Sept. 1-30	Oct. 1-31	Nov. 1-30	Jan. 1-31	Sept. 1-30	Oct. 1-31	Nov. 1-30	Jan. 1-31
EMU	11	13	3	1	4.0	2.9	3.7	0.7
CMU								
Montana	1				2.2			
North Dakota		5	2			4.6	11.5	
Minnesota	2	13	1	2	1.0	4.0	1.9	4.3
South Dakota	6	28	5	3	2.4	6.6	7.3	4.9
Wyoming								
Nebraska	5	15	2	1	4.8	8.6	7.1	4.0
Iowa		16	1	2		5.3	2.1	4.6
Missouri	2	3			2.9	2.6		
Kansas	2	14	1	3	3.0	12.5	5.5	18.6
Colorado				1				1.8
New Mexico								
Oklahoma		5	1			16.3	20.2	
Arkansas		1		1		0.7		4.5
North Texas	5	6	3	2	4.5	3.2	9.9	7.4
South Texas	63	46	7	10	75.2	32.6	30.8	49.2
Subtotals	86	152	23	25	96.0	97.1	96.3	99.3
WMU	0	0	0	0	0.0	0.0	0.0	0.0
Totals	97	165	26	26	100.0	100.0	100.0	100.0

Table A-68. Tests of independence between chronological migration patterns of adult and immature mourning doves into North Texas, based on direct recoveries of doves banded, 1967-74.

Test number	Area banded	Age class	Number of direct recoveries						G-statistic or X^2 value	Degrees of freedom	Level of significance[a]
			September			October					
			1-10	11-20	21-30	1-10	11-20	21-31			
1	Kansas	Adult	1	5	2	4	1	1	15.08	5	**
		Immature	10	6	4	0	3	0			
2	All States[b,c]	Adult	31	27	42	36	22	15	24.68	5	***
		Immature	94	45	41	42	22	9			
3	All States	Adult	--	27	42	36	22	15	5.58	4	
		Immature	--	45	41	42	22	9			
4	All States	Adult	31	←		142		→	19.10	1	***
		Immature	94	←		159		→			
5	Northern States[b]	Adult	13	12	30	30	20	13	6.75	5	
		Immature	14	16	26	36	16	4			
6	Southern States[c]	Adult	18	15	12	6	2	2	10.97	5	*
		Immature	80	29	15	7	6	5			
7	Southern States	Adult	--	15	12	6	2	2	1.98	4	
		Immature	--	29	15	7	6	5			
8	Southern States	Adult	18	←		37		→	8.98	1	***
		Immature	80	←		62		→			
9	North Texas	Adult	219	41	26	14	8	2	5.35	5	
		Immature	235	53	19	13	4	5			

[a] $P<0.10$*; $P<0.05$**; $P<0.01$***.
[b] MT, ND, MN, WI, IL, IA, SD, NE, and WY.
[c] NM, CO, OK, KS, MO, AR, and LA.

Table A-69. Direct recoveries in Mexico by 10-day periods for mourning doves banded in the Central Management Unit, 1967-74.

Age of bird banded	August			September			October			November			December		
	1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-31
Adult															
Number	0	0	1	0	0	1	7	21	12	14	7	7	7	6	4
Percent	--	--	0.6	--	--	0.6	4.3	13.0	7.4	8.6	4.3	4.3	4.3	3.7	2.5
Immature															
Number	0	0	0	3	3	9	23	67	56	47	39	18	19	15	14
Percent	--	--	--	0.7	0.7	2.0	5.0	14.7	12.3	10.3	8.5	3.9	4.2	3.3	3.1

Age of bird banded	January			February			March			April			May		
	1-10	11-20	21-31	1-10	11-20	21-28	1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-31
Adult															
Number	14	7	1	10	5	0	15	3	7	5	5	1	1	0	1
Percent	8.6	4.3	0.6	6.2	3.1	--	9.3	1.9	4.3	3.1	3.1	0.6	0.6	--	0.6
Immature															
Number	11	14	9	11	18	12	14	12	9	15	9	3	2	2	3
Percent	2.4	3.1	2.0	2.4	3.9	2.6	3.1	2.6	2.0	3.3	2.0	0.7	0.4	0.4	0.7

Table A-70. Estimated survival and recovery rates (%) of adult female mourning doves banded preseason in the Central Management Unit, 1967-74. Program ESTIMATE.

Reference areas	Total banded	Total recovered	Model of best fit	Probability of fit test	Survival rate	S.E.	95% C.I.	Recovery rate	S.E.	95% C.I.
Montana	1,055	6	--	--	--	--	--	--	--	--
North Dakota	1,664	21	--	--	--	--	--	--	--	--
Minnesota	1,974	43	--	--	--	--	--	--	--	--
South Dakota	9,093	280	2	0.13	59.1	3.1	52.9-65.2	1.4	0.11	1.2-1.6
Wyoming	536	5	--	--	--	--	--	--	--	--
Nebraska	4,473	68	--	--	--	--	--	--	--	--
Iowa	3,850	53	--	--	--	--	--	--	--	--
Missouri	2,682	90	3	0.47	33.2	4.3	24.8-41.6	2.2	0.27	1.7-2.8
Kansas	5,183	153	2	0.30	52.8	4.5	44.0-61.7	1.6	0.19	1.2-2.0
Colorado	6,728	113	2	0.20	57.6	5.2	47.3-67.8	0.9	0.11	0.7-1.1
New Mexico	3,710	41	--	--	--	--	--	--	--	--
Oklahoma	1,226	35	--	--	--	--	--	--	--	--
Arkansas	1,567	57	--	--	--	--	--	--	--	--
North Texas[a]	5,247	157	2	0.53	52.4	4.6	43.3-61.4	1.8	0.22	1.4-2.3
South Texas	1,745	59	--	--	--	--	--	--	--	--
Unweighted average					51.0			1.6		

[a]1968-74.

Table A-71. Estimated survival and recovery rates (%) of adult male mourning doves banded preseason in the Central Management Unit, 1967-74. Program ESTIMATE.

Reference areas	Total banded	Total recovered	Model of best fit	Probability of fit test	Survival rate	S.E.	95% C.I.	Recovery rate	S.E.	95% C.I.
Montana	1,723	19	--	--	--	--	--	--	--	--
North Dakota	3,418	51	--	--	--	--	--	--	--	--
Minnesota[a]	5,370	86	3	0.55	52.8	4.4	44.1-61.5	0.8	0.10	0.6-1.0
South Dakota	17,096	629	2	0.26	50.0	2.0	46.2-53.9	1.9	0.09	1.8-2.1
Wyoming	1,703	13	--	--	--	--	--	--	--	--
Nebraska	9,446	167	1	0.08	65.3	10.7	44.3-86.3	0.6	0.07	0.4-0.7
Iowa	9,126	129	3	0.77	52.0	3.7	44.8-59.2	0.7	0.08	0.6-0.9
Missouri	4,522	207	3	0.21	48.1	2.8	42.5-53.7	2.4	0.20	2.0-2.8
Kansas	7,601	258	3	0.48	48.1	2.7	42.7-53.4	1.8	0.14	1.6-2.1
Colorado	8,758	162	2	0.11	56.9	4.4	48.3-65.6	1.1	0.11	0.9-1.3
New Mexico	6,467	94	--	--	--	--	--	--	--	--
Oklahoma	1,757	52	--	--	--	--	--	--	--	--
Arkansas	2,823	78	--	--	--	--	--	--	--	--
North Texas[b]	10,926	430	1	0.05	43.9	3.2	37.6-50.2	2.3	0.16	2.0-2.6
South Texas[b]	3,774	164	3	0.09	48.3	3.7	41.2-55.5	2.4	0.22	1.9-2.8
Unweighted average					51.7			1.6		

[a] 1967-73.
[b] 1968-74.

Table A-72. Estimated survival and recovery rates (%) of adult mourning doves banded preseason in the Central Management Unit, 1967-74. Program ESTIMATE.

Reference areas	Total banded	Total recovered	Model of best fit	Probability of fit test	Survival rate	S.E.	95% C.I.	Recovery rate	S.E.	95% C.I.
Montana	2,970	27	--	--	--	--	--	--	--	--
North Dakota	5,475	76	3	0.19	61.5	5.2	51.4-71.7	0.6	0.09	0.4-0.8
Minnesota[a]	7,861	137	3	0.60	51.3	3.5	44.4-58.2	0.9	0.09	0.7-1.1
South Dakota	26,765	931	1	0.35	54.4	2.4	49.6-59.1	1.9	0.08	1.7-2.0
Wyoming	2,524	19	--	--	--	--	--	--	--	--
Nebraska	14,211	238	1	0.44	58.8	6.3	46.5-71.2	0.6	0.06	0.5-0.7
Iowa	13,165	185	1	0.51	60.8	6.9	47.4-74.2	0.6	0.07	0.5-0.8
Missouri	7,300	299	3	0.29	44.1	2.4	39.4-48.8	2.3	0.16	2.0-2.6
Kansas	12,922	415	2	0.09	50.1	2.6	44.9-55.2	1.7	0.12	1.5-2.0
Colorado	15,532	275	1	0.03	60.7	5.1	50.8-70.7	1.2	0.10	1.0-1.3
New Mexico	10,358	139	1	0.04	65.1	11.4	42.8-87.5	0.8	0.10	0.6-1.0
Oklahoma[b]	3,152	93	3	0.35	43.2	4.5	34.3-52.1	1.7	0.21	1.3-2.2
Arkansas	4,526	138	3	0.16	31.5	3.5	24.6-38.4	2.1	0.20	1.7-2.5
North Texas[b]	17,032	617	1	0.05	46.3	2.7	41.0-51.7	2.2	0.13	1.9-2.4
South Texas[b]	6,155	252	3	0.08	49.4	2.9	43.7-55.1	2.2	0.17	1.8-2.5
Unweighted average					52.1			1.4		

[a]1967-73.
[b]1968-74.

Table A-73. Estimated survival and recovery rates (%) of adult mourning doves banded preseason in the Central Management Unit, 1967-74. Program BROWNIE.

Reference areas	Total banded	Total recovered	Model of best fit	Probability of fit test	Survival rate	S.E.	95% C.I.	Recovery rate	S.E.	95% C.I.
Montana	2,970	27	--	--	--	--	--	--	--	--
North Dakota	5,475	76	--	--	--	--	--	--	--	--
Minnesota	8,155	139	H02	0.42	54.6	3.3	48.2-61.1	0.8	0.09	0.7-1.0
South Dakota	26,765	931	H1	0.58	54.6	2.3	50.1-59.1	1.8	0.07	1.6-1.9
Wyoming	2,524	19	--	--	--	--	--	--	--	--
Nebraska	14,211	238	H1	0.07	58.3	5.8	47.0-69.6	0.6	0.05	0.5-0.7
Iowa	13,165	185	H1	0.46	61.4	6.6	48.5-74.3	0.6	0.06	0.5-0.8
Missouri	7,300	299	H02	0.10	46.5	2.3	42.0-51.1	2.3	0.15	2.0-2.6
Kansas	12,922	415	H02	0.03	51.6	2.3	47.0-56.1	1.8	0.12	1.5-2.0
Colorado	15,532	275	H02	0.03	56.5	2.8	50.9-62.0	1.0	0.08	0.8-1.1
New Mexico	10,358	139	H1	0.07	66.4	11.3	44.4-88.5	0.7	0.09	0.6-0.9
Oklahoma	3,170	96	--	--	--	--	--	--	--	--
Arkansas	4,526	138	H02	0.42	35.4	3.4	28.9-42.0	2.1	0.25	1.7-2.6
North Texas[a]	17,032	617	H1	0.66	47.1	2.6	42.0-52.2	2.1	0.11	1.8-2.3
South Texas[a]	6,155	252	H01	--	47.6	2.5	42.8-52.5	2.2	0.16	1.9-2.6
Unweighted average					52.7			1.5		

[a]1968-74.

Table A-74. Estimated survival and recovery rates (%) of immature mourning doves banded preseason in the Central Management Unit, 1967-74. Program BROWNIE.

Reference areas	Total banded	Total recovered	Model of best fit	Probability of fit test	Survival rate	S.E.	95% C.I.	Recovery rate	S.E.	95% C.I.
Montana	10,125	141	--	--	--	--	--	--	--	--
North Dakota	9,707	162	--	--	--	--	--	--	--	--
Minnesota	17,217	301	H02	0.42	35.6	5.0	25.8-45.3	1.2	0.09	1.0-1.3
South Dakota	21,160	690	H1	0.58	41.4	4.3	32.9-49.9	1.7	0.09	1.5-1.9
Wyoming	4,407	49	--	--	--	--	--	--	--	--
Nebraska	12,216	237	H1	0.07	67.8	10.0	48.2-87.4	0.8	0.09	0.6-0.9
Iowa	10,701	191	H1	0.46	55.4	8.5	38.8-72.0	1.0	0.10	0.9-1.2
Missouri	13,666	619	H02	0.10	26.1	2.8	20.6-31.6	3.6	0.17	3.3-3.9
Kansas	8,967	254	H02	0.03	43.7	4.8	34.3-53.1	1.6	0.17	1.3-1.9
Colorado	13,721	247	H02	0.03	49.3	5.7	38.2-60.4	1.2	0.10	1.0-1.4
New Mexico	15,887	256	H1	0.07	50.0	8.1	34.2-65.9	0.8	0.07	0.6-0.9
Oklahoma	13,031	405	--	--	--	--	--	--	--	--
Arkansas	7,584	386	H02	0.42	29.6	4.5	20.7-38.5	4.5	0.29	4.0-5.1
North Texas[a]	16,699	673	H1	0.66	42.6	3.9	35.0-50.0	2.6	0.13	2.4-2.9
South Texas[a]	6,676	305	H01	--	40.0	4.6	31.0-49.0	3.0	0.21	2.6-3.4
Unweighted average					43.8			2.0		

[a]1967-74.

Table A-75. Tests of hypothesis that adult male and female mourning doves have similar survival and recovery rates.

Reference areas	df	X^{2a}
Montana	--	--
North Dakota	--	--
Minnesota	--	--
South Dakota	17	23.6
Wyoming	--	--
Nebraska	17	13.8
Iowa	17	16.3
Missouri	16	26.2*
Kansas	17	13.7
Colorado	17	17.3
New Mexico	--	--
Oklahoma	15	11.7
Arkansas	--	--
North Texas	15	24.9*
South Texas	--	--
Totals	131	147.5

[a]$P<0.10$*.

Table A-76. Tests of hypothesis that mourning doves in hunting and non-hunting States have similar survival rates.

Program	Age	Survival rate		Difference	Z value[c]
		Non-hunting[a]	Hunting[b]		
ESTIMATE	Adult	58.1	48.8	9.3	2.77**
BROWNIE	Adult	58.1	50.2	7.9	2.17**
BROWNIE	Immature	52.9	40.2	12.7	2.51**

[a]Non-hunting States include MN, NE, and IA in BROWNIE plus ND in ESTIMATE.
[b]Hunting States include MO, KS, CO, NM, AR, N.TX, and S.TX in BROWNIE plus OK in ESTIMATE.
[c]$P<0.05$**.

Table A-77. Tests of hypothesis that survival and recovery rates of adult mourning doves are constant.

Reference areas	Males		Females		All adults	
	df	X^{2a}	df	X^{2a}	df	X^{2a}
Montana	--	--	--	--	--	--
North Dakota	--	--	--	--	22	27.4
Minnesota	20	18.5	--	--	23	20.6
South Dakota	35	123.6***	33	96.0***	40	207.8***
Wyoming	--	--	--	--	--	--
Nebraska	34	128.2***	22	42.7***	37	149.3***
Iowa	25	19.4	17	45.4***	29	43.3**
Missouri	27	32.3	14	13.7	29	32.6
Kansas	27	26.7	23	32.6*	31	44.0*
Colorado	25	72.5***	22	63.8***	31	114.6***
New Mexico	--	--	--	--	22	53.8***
Oklahoma	--	--	--	--	15	16.4
Arkansas	--	--	--	--	16	21.5
North Texas	26	59.5***	20	36.9***	27	76.9**
South Texas	20	28.8*	--	--	24	33.7*
Totals	239	509.5***	151	331.1***	346	841.9***

[a] $P<0.10$*; $P<0.05$**; $P<0.01$***.

Table A-78. Tests of hypothesis that direct recovery rates of adult mourning doves are constant within specific reference areas.

Reference areas	Males		Females		All adults	
	df	X^{2a}	df	X^{2a}	df	X^{2a}
Montana	--	--	--	--	--	--
North Dakota	--	--	--	--	7	12.9*
Minnesota	6	1.8	--	--	6	3.6
South Dakota	7	54.7***	7	38.8***	7	92.3***
Wyoming	--	--	--	--	--	--
Nebraska	7	13.7*	7	5.4	7	9.0
Iowa	7	4.2	7	20.7***	7	6.2
Missouri	7	5.6	7	6.7	7	3.1
Kansas	7	5.5	7	11.3	7	10.1
Colorado	7	46.8***	7	19.8***	7	58.5***
New Mexico	--	--	--	--	7	32.5***
Oklahoma	--	--	--	--	6	6.7
Arkansas	--	--	--	--	7	13.7**
North Texas	6	17.9***	6	22.3***	6	31.6***
South Texas	6	7.1	--	--	6	10.2
Totals	60	157.3***	48	125.0***	87	290.4***

[a] $P<0.10$*; $P<0.05$**; $P<0.01$***.

Table A-79. Tests of hypothesis that both recovery and survival rates of adult mourning doves vary time-specifically (Model 1) vs. the hypothesis that recovery rates vary time-specifically but survival is constant (Model 2).

Reference areas	Fit of Model 1		Fit of Model 2		Model 2 vs. Model 1	
	df	X^{2a}	df	X^{2a}	df	X^{2a}
Montana	--	--	--	--	--	--
North Dakota	6	5.1	13	13.1	6	8.9
Minnesota	9	9.9	15	14.3	5	4.5
South Dakota	21	22.8	26	41.8**	6	21.0***
Wyoming	--	--	--	--	--	--
Nebraska	17	17.1	24	32.3	6	15.3**
Iowa	12	11.2	19	25.3	6	13.1**
Missouri	13	19.5**	19	26.5	--	--
Kansas	16	24.6*	24	33.4*	6	8.4
Colorado	14	24.8**	20	37.8***	--	--
New Mexico	11	20.1**	15	29.3**	--	--
Oklahoma	3	3.8	7	7.7	5	4.3
Arkansas	--	--	--	--	--	--
North Texas	14	23.5*	19	34.8**	5	12.6**
South Texas	11	11.1	15	16.6	5	5.4
Totals	147	193.5***	216	312.9***	50	93.5***

[a]P<0.10*; P<0.05**; P<0.01***.

Table A-80. Production required to compensate for annual mortality to maintain a constant breeding population of mourning doves in the Central Management Unit.

CMU reference areas	Survival rate (%)		Production required
	Adults	Immatures	Young per pair of adults
Montana	--	--	--
North Dakota	--	--	--
Minnesota	54.6	35.6	2.6
South Dakota	54.6	41.4	2.2
Wyoming	--	--	--
Nebraska	58.3	67.8	1.2
Iowa	61.4	55.4	1.4
Missouri	46.5	26.1	4.1
Kansas	51.6	43.7	2.2
Colorado	56.5	49.3	1.8
New Mexico	66.4	50.0	1.3
Oklahoma	--	--	--
Arkansas	35.4	29.6	4.4
North Texas	47.1	42.6	2.5
South Texas	47.6	40.0	2.6
CMU average	52.7[a]	43.8[a]	2.2

[a]Unweighted.

Table A-81. Differential vulnerability of immature and adult mourning doves in the Central Management Unit, 1967-74[a].

CMU reference areas	Average direct recovery rate		Average relative recovery rate
	Immatures	Adults	
Montana	0.0087 (88)	0.0030 (9)	2.90
North Dakota	0.0090 (87)	0.0062 (34)	1.45
Minnesota	0.0118(203)	0.0087 (71)	1.36
South Dakota	0.0197(416)	0.0187(501)	1.05
Wyoming	0.0073 (32)	0.0028 (7)	2.61
Nebraska	0.0072 (88)	0.0058 (83)	1.24
Iowa	0.0107(114)	0.0069 (91)	1.55
Missouri	0.0356(486)	0.0248(181)	1.44
Kansas	0.0159(143)	0.0183(236)	0.87
Colorado	0.0102(140)	0.0092(143)	1.11
New Mexico	0.0083(132)	0.0068 (70)	1.22
Oklahoma	0.0196(256)	0.0189 (60)	1.04
Arkansas	0.0421(319)	0.0228(103)	1.85
North Texas	0.0270(453)	0.0226(387)	1.19
South Texas	0.0300(204)	0.0216(133)	1.39
Average			1.29[b]

[a]Number of recoveries in parentheses.
[b]Excludes figures from MT and WY because of small sample size.

Table A-82. Proportion of deaths due to hunting of adult and immature mourning doves banded preseason in the Central Management Unit, 1967-74.

Function	Adults (%)	Immatures (%)
Recovery rate[a]	1.5	2.0
Harvest rate[b]	3.3	4.4
Kill rate[c]	4.7	6.3
Mortality rate[d]	47.3	56.2
Proportion of mortality attributed to hunting	9.9	11.2

[a]From Tables 73 and 74.
[b]Recovery rate ÷ band reporting rate = harvest rate; band reporting rate ≈ 45% (Reeves 1979).
[c]Harvest rate ÷ 1 - crippling rate = kill rate; crippling rate ≈ 30%.
[d]From Tables 73 and 74 (1 - survival rate = mortality rate).

Appendix B

State Representatives on the Central Migratory Shore and Upland Game Bird Technical Committee

Arkansas Game and Fish Commission	James S. Walter
Colorado Division of Wildlife	Howard D. Funk Clait E. Braun
Iowa Conservation Commission	Ronnie R. George
Kansas Fish and Game Commission	Marvin Kraft Gerald J. Horak
Minnesota Division of Fish and Wildlife	Roger M. Holmes
Missouri Department of Conservation	Kenneth C. Sadler
Montana Department of Fish, Wildlife, and Parks	Dale Witt
Nebraska Game and Parks Commission	Norman Dey Joe Hyland
New Mexico Department of Game and Fish	James Sands Thomas P. Zapatka
North Dakota Game and Fish Department	Charles H. Schroeder
Oklahoma Department of Wildlife Conservation	Lemuel A. Due Diane Love
South Dakota Department of Game, Fish, and Parks	Thomas Kuck
Texas Parks and Wildlife Department	Ted L. Clark Kenneth E. Gamble W. F. Harwell James H. Dunks
Wyoming Game and Fish Department	George F. Wrakestraw Richard Saul

Appendix C

Individuals and Agencies Who Banded More than 100 Mourning Doves

State of banding	Bander	Number of doves banded
Arkansas	T. W. Booth, Jr.	4,846
	Holla Bend NWR	2,935
	Arkansas Game and Fish Commission	1,373
	A. G. Pursley	632
	White River NWR	504
	J. R. Hall	482
	M. J. Turner	444
	C. D. Plant	418
	Big Lake NWR	232
Minnesota	University of Minnesota, Morris	10,118
	Minnesota Division of Fish and Wildlife	3,801
	Wetlands Manager	3,456
	D. J. Fiedler	2,467
	D. J. Langowski	1,363
	Sherburne NWR	1,238
	H. M. Reeves	606
	J. A. Hart	482
	G. V. Orton	420
	J. E. Cross	372
	A. H. Grewe, Jr.	221
	Agassiz NWR	208
	A. C. Anderson	148
	Upper Mississippi NWR	114
Montana	Montana Department of Fish, Wildlife, and Parks	8,306
	Charles M. Russell NWR	2,771
	UL Bend–Bowdoin NWR	2,014
North Dakota	North Dakota Game and Fish Department	12,637
	Tewaukon NWR	774
	J. Clark Salyer NWR	477
	T. Grosz	392
	B. Burkett	278
	T. L. Sechrist	210
	Des Lacs NWR	122
North Texas	Texas Parks and Wildlife Department	32,853
	C. Q. Heumier	658
	R. C. Droll	132
	E. G. Bolen	131
Oklahoma	Oklahoma Cooperative Wildlife Research Unit	11,496
	Oklahoma Department of Wildlife Conservation	2,316
	L. L. Broyles	1,184
	Tishomingo NWR	763
	Sequoyah NWR	224
	Salt Plains NWR	183

South Dakota	South Dakota Department of Game, Fish, and Parks	18,842
	D. W. Fisher	15,750
	H. T. Lovrien	10,771
	Waubay NWR	1,173
	Sand Lake NWR	888
	B. D. Law	165
	G. M. Jonkel	123
South Texas	Texas Parks and Wildlife Department	12,847
Wyoming	Wyoming Game and Fish Department	4,428
	Seedskadee NWR	2,454

Appendix D

Glossary

The following definitions reflect usage of terms for mourning dove banding and recovery data in this analysis.

adult A dove known to have hatched at least one year before the calendar year of banding.

age (or year) class The approximate age of a dove at the time of banding.

banding periods Times of year when doves were banded.

bands Serially numbered aluminum rings placed on legs of birds for identification.

bird banding laboratory (BBL) The BBL is the official repository for banding and recovery data of migratory birds in the United States and Canada. The BBL is located at Patuxent Wildlife Research Center in Laurel, Maryland.

cohort A group of doves sharing common characteristics as defined (i.e., age, sex, or origin).

comparative recovery factors (CRF's) Computed values that reflect the relative probabilities of doves from several banding areas being recovered in a specified harvest location. CRF's are computed by dividing the smallest recovery rate index into each index of a series being compared.

coordinates Coordinates identify the 10-min block of north latitude and west longitude (grid) in which a banding or recovery occurred.

crippling rate (loss) The proportion of hunter-downed doves that is not retrieved because the birds were wounded and lost.

derivation of the harvest The relative importance (%) of breeding or natal areas of origin for specific harvest areas.

direct recovery A banded dove killed or found dead during the first hunting season after being banded.

distribution of recoveries The relative importance (%) of harvest areas for specific breeding or natal areas.

distribution of the harvest The relative importance (%) of specific geographical areas within a general harvest area. This measurement can be expressed as percentages of total harvest or as harvests per land unit.

encounter An observation of a previously banded dove. Encounters may be obtained through hunting or finding birds dead, trapping, or sightings by observers.

goodness of fit A chi-square test of how well the hypothesis being tested fits the observed data.

harvest A general term for the number of doves killed in a particular area during the legal hunting season.

harvest areas Areas where doves are harvested. Areas in the United States conform to State boundaries, except for Texas which was divided into two zones. Latin America was divided into 12 regions.

harvest rate The hunter-related recovery rate adjusted to reflect the proportion of bands encountered but not reported. Recovery Rate ÷ Reporting Rate = Harvest Rate.

hunting season The period of time during each year when a legal dove hunting season was allowed. Hunting seasons in the United States extended from 1 September to 31 January; in Mexico and Central America, the hunting seasons encompassed 1 August through 31 May.

immature A young dove capable of sustained flight known to have hatched during the same calendar year in which it was banded.

indirect recovery A banded dove killed or found dead during any hunting season subsequent to the first hunting season after being banded.

kill The numbers of doves shot by hunters or found dead during the hunting season. Throughout the text, "kill" is used synonymously with "harvest." However, when combined with "rate," its meaning is different.

kill rate The proportion of a population dying as a result of hunting. Harvest Rate ÷ 1 – Crippling Rate = Kill Rate.

life equations Mathematical models relating mortality rates to recruitment rates.

management units Three administrative units in the United States (Eastern, Central, and Western) were defined by migratory differences of their respective dove populations. The CMU is composed of Montana, North Dakota, Minnesota, South Dakota, Wyoming, Nebraska, Iowa, Missouri, Kansas, Colorado, New Mexico, Oklahoma, Arkansas, and Texas. The EMU and WMU are composed of the States east and west of the CMU, respectively.

maximum likelihood An approach to estimation of parameters from animal marking experiments. For a given model, no other method will produce consistent estimators with a smaller sampling variance.

mortality Mourning doves are continuously exposed to death from many causes such as starvation, inclement weather, disease, predation, and hunting. Banding data are utilized to estimate the proportion of mortality from all sources that occurs during a specific time period, usually one year.

mortality rate The probability (%) that a bird alive when a given cohort is banded will not survive one calendar year to the time of next banding. 1 – Survival Rate = Mortality Rate.

nestling A young dove still in the nest and incapable of sustained flight. Nestling banding data were omitted from this analysis.

normal wild-banded bird A wild bird, apparently in good health, which has been captured, marked with a standard leg band, and immediately released at the location where banded.

option 1 Test of the null hypothesis in Program BROWNIE that two adult data sets have similar survival and recovery rates. Banding and recovery periods must be identical.

permittee The holder of a Federal migratory bird banding, marking, and salvage permit.

postseason The 4½-month period of 15 January through 31 May immediately after the close of most dove hunting seasons in the United States. Banding data from this period were omitted from this analysis.

preseason The 3-month period of 1 June through 31 August before the opening of dove hunting seasons (1 September). Only preseason bandings were considered in this analysis.

program BROWNIE A computer program containing several age-dependent models to estimate survival and recovery rates for adult and immature mourning doves.

program ESTIMATE A computer program containing several age-independent models to estimate survival and recovery rates for adult mourning doves only.

recovery A banded bird killed or found dead and reported to the BBL. A recovery relates to a dead bird and is a terminal record.

recovery rate This term refers to two different computations:

Its traditional definition was the proportion of banded birds that is subsequently shot or found dead and reported to the BBL. Recoveries ÷ Bandings = Recovery Rate. Direct, indirect, and total recovery rates are computed in this manner. The computer derivation is the probability (%) that a banded bird alive when a given cohort is banded will be shot during the next hunting season and reported to the BBL. This estimate is a composite rate that was computed by either program BROWNIE or ESTIMATE and should not be confused with the traditional estimate.

recovery rate index Direct band recovery rate multiplied by 10,000.

relative recovery rate The probability of an individual in one cohort being recovered in comparison to an individual in another (e.g., immatures:adults).

repeat (retrap) A banded bird recaptured and released alive within the same banding coordinates and within the same 3-month period in which it was originally banded. Repeat records were omitted from this analysis.

reporting rate The proportion of banded birds killed or found dead by hunters that is subsequently reported to the BBL. Recoveries ÷ Hunter Encounters = Reporting Rate.

return A banded bird that was recaptured and released alive within the same coordinates in which it was originally banded at least 90 days from the date of banding. Return records were omitted from this analysis.

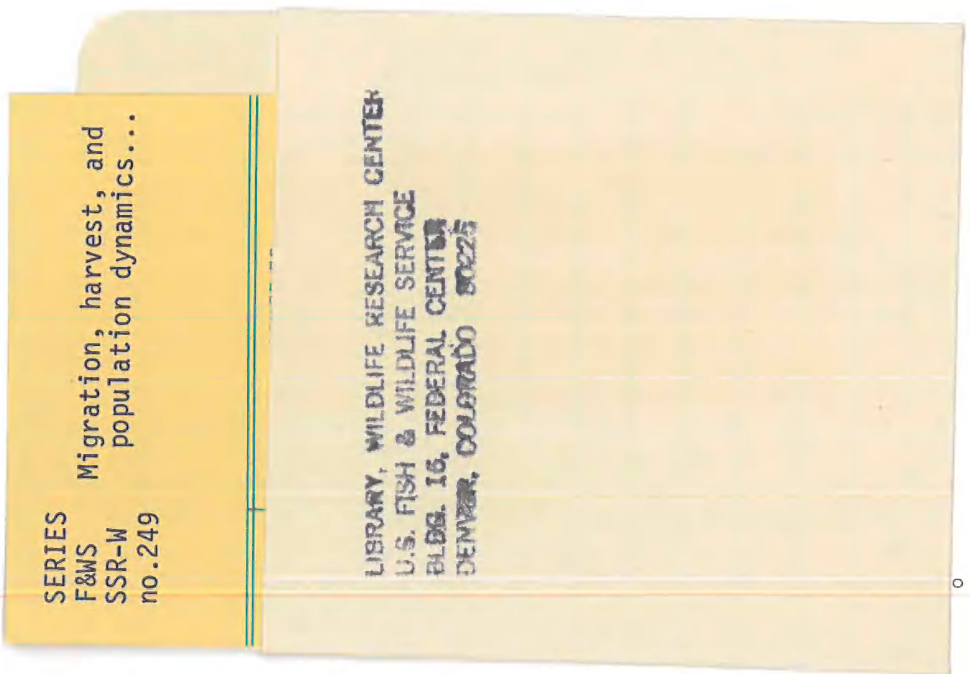
status A BBL computer code which describes the physical condition of a bird at the time of banding (e.g., normal, experimental, etc.).

survival rate The probability (%) that a bird alive when a given cohort is banded will survive one calendar year to the time of next banding.

tabulation A computer-produced data summary printed on paper.

tiers States of the CMU and WMU were arbitrarily grouped into north-south oriented tiers to compare derivation of harvest among the Southern Zone countries.

weighting An adjustment to the number of bands recovered from specific harvest areas to compensate for differences in banding efforts among origination areas, as well as varying sizes of areas and densities of breeding birds within them. Each recovery is placed in perspective to the number of birds it represents and allows computation of the relative contribution that all breeding areas make to the harvest of specific areas.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225. Scalation of the American Alligator, by Charles A. Ross and Charles D. Roberts. 1979. 8 pp.

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226. Waterfowl Status Report, 1975, compiled and edited by James R. Goldsberry, Sharon L. Rhoades, Lonnie D. Schroeder, and Morton M. Smith. 1980. 86 pp.
227. Waterfowl Status Report, 1976, compiled and edited by William W. Larned, Sharon L. Rhoades, and K. Duane Norman. 1980. 88 pp.
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229. The Rocky Mountain Population of the Western Canada Goose: Its Distribution, Habitats, and Management, by William B. Krohn and Elwood G. Bizeau. 1980. 93 pp.
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235. Bats and Environmental Contaminants: A Review, by Donald R. Clark, Jr. 1981. 27 pp.

(Reports 236 and 237 are in one cover)

236. Waterfowl Status Report, 1977, compiled and edited by Carey S. Smith, Sharon L. Rhoades, and K. Duane Norman. 1981. 88 pp.
237. Waterfowl Status Report, 1978, compiled and edited by Albert N. Novara, Sharon L. Rhoades, Betty I. Hodges, and K. Duane Norman. 1981. 96 pp.
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244. Technique for Structuring Wildlife Guilds to Evaluate Impacts on Wildlife Communities, by Henry L. Short and Kenneth P. Burnham. 1982. 34 pp.
245. Organochlorine Residues in Eggs of Alaskan Seabirds, by Harry M. Ohlendorf and others. 1982. 41 pp.
246. Waterfowl Status Report, 1979, compiled and edited by James F. Voelzer and others. 1982. 96 pp.
247. Ecology of Bald Eagles Wintering Near a Waterfowl Concentration, by Curtice R. Griffin, Thomas S. Baskett, and Rollin D. Sparrowe. 1982. 12 pp., illus.
248. Habitat Use and Productivity of Canvasbacks in Southwestern Manitoba, 1961–72, by Jerome H. Stoudt. 1982. 31 pp.